CHARITIES

EDWARD T. DEVINE
New York

THE COMMONS
GRAHAM TAYLOR
Chicago

JEWISH CHARITY
LEE K. FRANKEL
New York

Publication Committee

ROBERT W. DE FOREST, CHAIRMAN

JANE ADDAMS, CHICAGO
ROBERT S. BREWSTER, NEW YORK
MARGARET DREIER ROBINS, CHICAGO
ARTHUR F. ESTABROOK, BOSTON
DANIEL C. GILMAN, BALTIMORE
WILLIAM GUGGENHEIM, NEW YORK
WILLIAM E. HARMON, NEW YORK
JOSEPH LEE, BOSTON
JOHN F. MOORS, BOSTON
SIMON N. PATTEN, PHILADELPHIA
JACOB A. RIIS, NEW YORK
ROBERT TREAT PAINE, BOSTON
FRANK TUCKER, NEW YORK
S. W. WOODWARD, WASHINGTON

Volume XVI. AUGUST 4, 1906 Number 18.

CONTENTS

467 *Work of Rehabilitation in San Francisco*

468 *Dairy Specials*

469 *The Albany Prison Congress*

469 *The New Massachusetts Commission for the Blind*

470 *Placing the Handicapped*

470 *Expansion of Sociology at the University of Missouri*

471 *The Rand School for Socialists*

471 *The Hampton Negro Conference*

472 *Organizing the Retail Clerks*

473 *The Public Duty of Public Service* — *Graham Taylor*

474 *Here's to Oregon* — *Florence Kelley*

475 *The Milk Campaign in Maryland* — *H. Wirt Steele*

475 *"If She Would Lay the Horn Aside for a Moment"—The Chicago Daily News*

The Baltimore Milk Show 476

What the Public Ought to Know as to Milk — *John S. Fulton, M. D.* 479

Municipal Milk Work in Rochester — *Geo. W. Goler, M. D.* 484

The Production of Clean Milk from a Practical Standpoint — *Samuel C. Prescott* 488

The Claims of the Baby in the Discussion of the Milk Question — *J. H. M. Knox* 493

Dairy Work Under The United States Department of Agriculture — *Clarence B. Lane* 496

Tuberculosis of Cattle and its Relation to Public Health — *Leonard Pearson* 497

Present Needs of the Milk Supply of Baltimore — *C. Hampson Jones, M. D.* 499

Morbific and Infectious Milk — *George M. Kober* 502

The Role of Pure Cow's Milk and Infant Feeding — *A. Jacobi* 505

CHARITIES AND THE COMMONS is a weekly review of philanthropy and social advance, published under a national publication committee of the New York Charity Organization Society and edited by the following staff: Edward T. Devine, editor; Graham Taylor, associate; Lee K. Frankel, associate for Jewish Charity; Paul U. Kellogg, managing editor; Arthur P. Kellogg, business manager; Friend Pitts, Jr., advertising; Graham Romeyn Taylor, western representative.

The first weekly issue of each month appears as an enlarged magazine number. Subscription price, two dollars a year in advance; foreign postage, $1.40 a year additional. Single copies, ten cents each. Publication office, 105 East 22d St., New York; Chicago office, 1001 Monadnock Building.

Ten Cents a Copy **$2 a Year**

Established 1882.
Incorporated 1904.
Tel: 1450 Gramercy.

Branch Office:
UNITED STATES EXPRESS CO.
WESTERN UNION TELEGRAPH CO.

THE LEXINGTON TRANSFER CO.

General Freight and Express Forwarders

156 East 23d St. NEW YORK

HENRY SEYBOLD, Bookbinder

No. 28 Lafayette Place,

NEAR ASTOR PLACE NEW YORK CITY

All Kinds of Library, Architectural and Fine Job Work

Especial Attention to Institution Work

SOAP OF ALL KINDS

For

INSTITUTIONS AND HOTELS

We sell The United Charities and shall be pleased to sell you

THOMAS BRENNAN

1267 Broadway, New York City

JACOB HERRLICH & BRO.

UNDERTAKERS

AND

EMBALMERS

332 E. 86th Street Bet. 1st and 2d Aves. Tel. Call, 21-79th

506 Sixth Street Bet. Avenues A and B Tel. Call, 1414 Orchard

NEW YORK CITY

SAYLES, ZAHN COMPANY

Fresh and Salt Meats

Family Trade a Specialty

Sixth Avenue and Tenth Street, NEW YORK

TELEPHONE, 1580 GRAMERCY

Open 6.30 a. m. Close 12.00 p. m.

ROE'S RESTAURANT

AND LADIES' DINING ROOM

402 FOURTH AVENUE

S. W. Cor. 28th St. NEW YORK

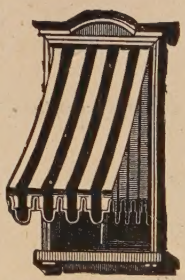
Take Notice of Number and Corner

PRENTISS CLOCKS

run sixty days on a single winding, and keep perfect time throughout their long run. They are the only sixty-day clocks manufactured in the world, and therefore could not be obtained elsewhere at any price. The Calendar also adds greatly to its convenience, and requires no attention whatsoever but winding once a year. *Also Frying-Pan, Program, Electric, Synchronized and "Approved" Watchman's Clocks.* Send for Catalogue No. 906.

THE PRENTISS CLOCK IMPROVEMENT CO.

Dept. 90, 49 Dey St., New York City



Established 1846

John T. Vause & Son

Manufacturers of Mildew-Proof

Awnings

Office Buildings and Country Work a Specialty.

218 BOWERY, NEW YORK

Bet. Spring and Prince Streets

Awnings taken down and stored for the Winter

A MANUAL OF PRACTICAL CHARITY

HOW TO HELP

By MARY CONYNGTON

A book designed primarily for non-professional workers among the poor, giving a clear, non-technical account of the modern charity organization movement, its work and its methods; describing the agencies for charitable relief; discussing the forms of distress most likely to be encountered, and suggesting the more effective methods of relief. Practical, well-written and valuable for everyone interested in charitable work. Just issued. 371pp. 8vo. Cloth. Price $1.50. May be ordered through dealers or will be sent prepaid on receipt of price.

THE RONALD PRESS CO.

229 BROADWAY - - - NEW YORK

Edward T. Devine
Editor
Graham Taylor, Associate
Lee K. Frankel, Associate for Jewish Charity

"The Commons" merged November, 1905
"Jewish Charity" merged March, 1906

CHARITIES
and The Commons

Published Every Saturday

Two Dollars a Year

VOL. XVI August 4, 1906 No. 18

Work of Rehabilitation in San Francisco

Public announcement was made in San Francisco in July that the bread line and the clothes line would be discontinued on August 1, thus finishing the wholesale work of relief so far as these two necessities of life are concerned. The same date marks the withdrawal of Edward T. Devine as special agent of the American National Red Cross and as executive officer and member of various emergency bodies.

There remains the important problem of housing the five or ten thousand people of San Francisco who are without permanent shelter, before the inclement weather of next winter sets in. A comprehensive report was made early in July in behalf of the Executive Commission and the Rehabilitation Committee, by Dr. Devine, as chairman of both bodies. Although nearly half of the long summer, which fortunately lay between April and the winter season, had elapsed, no real beginning had as yet been made by private enterprise or otherwise in the erection of dwellings. The constructive recommendations of this report were made the basis of favorable action by the Finance Committee at a meeting on July 13, and initiated a far-reaching scheme of rehabilitation.

The first problem considered was the care of those who are entirely dependent. These are the aged and infirm, the chronic invalids and other adult dependent persons for whom it is not so much a question of rehabilitation as of permanent maintenance. The Finance Committee set aside $100,000 for the immediate construction of a building or pavilion on the Alms House Tract of San Francisco, to afford accommodation for 1000 people. The committee also set aside $150,000 for the construction and repair of temporary buildings in the public parks to afford shelter for the homeless during the coming winter.

The more serious problem concerned families who ordinarily pay a moderate rental, who do not own land and have no considerable savings, but who are in receipt of ordinary wages. It was estimated that there are at least 5000 such families in the tents or temporary shelters already provided. It is obvious that the tents which have been in use many months will not be sufficient shelter for the coming winter. In addition to these 5000 it is probable that a large number of those who were dwelling in San Francisco at the time of the earthquake, are still in the surrounding towns and will return. To meet this necessity, it was determined to form an incorporated body to consist of the members of the Finance Committee of the Relief and Red Cross Funds, together with the governor of the state of California and the mayor of the city of San Francisco. An executive committee of three will have full power to transact business subject to the supervision and approval of the Board of Directors. The Finance Committee voted to turn over to the new corporation $2,500,000, to be used in the acquisition of tracts of land in suitable and convenient locations in the city

and in the erection of buildings thereon for dwelling purposes, such buildings to be either cottages, two-story dwellings, or flats containing apartments of from three to six rooms and bath. These buildings will be sold for cash or upon the instalment plan to *bona fide* residents of San Francisco. All money returned to the fund is to be reinvested in the same manner as the original fund until such time as the rehabilitation of San Francisco shall have been accomplished. Money then in the treasury is to be disposed of in some way for the benefit of the people of the city and county of San Francisco.

Two other funds were provided for. There were a large number of working men and others of small means, who owned their own homes in the old San Francisco. The committee felt that it was of first importance to establish these people again on their original holdings. In order that this might be done as expeditiously as possible, the committtee set aside $500,000, from which will be given to each lot owner a sum equal to one-third of the cost of the building he constructs on his lot in the burned district. Such donation will not exceed $500 in any one case, and no more than one donation will be given to any one person or family. In order to protect the contractor and to expedite the building, this money is to be turned over to the contractor at the completion of the building. Another fund of $500,000 is set aside to make loans to any resident of San Francisco, either owner or tenant, whose place of residence was burned in the great fire. These loans can be used in building new dwellings anywhere in San Francisco on lots owned by the person or family to whom they are made. The owner may borrow one-third of the entire cost of the building, provided it does not at any time exceed $1000 and no more than one loan is to be made to the person or family. As security for the loan, a second mortgage is to be taken upon the building and lot and if necessary the borrower is to pay five per cent. net interest.

To quote from the report to the Finance Committee:—

> The essential thing at this time is that, at the earliest possible moment some of the funds which are now lying idle in the treasury of the Finance Committee, shall be put at work providing homes for the working people of the community. The plan which we have recommended is proposed, first, as a relief measure because the tents will not provide proper shelter after October; second, as a measure of public policy, because in the interests of the community it is not desirable that San Francisco shall lose her present population of working people merely because there are not dwellings to be rented or bought; third, also as a measure of public policy, because it is desirable that workingmen shall have the opportunity to own their homes, and this opportunity is now afforded not on a charitable but on a reasonable and just business basis; and finally, because the intelligent and efficient carrying out of the plan proposed will enable the community to set a standard of attractive, sanitary, safe and yet comparatively inexpensive dwellings which will have a beneficial effect, not only in the immediate future but for the coming generation. The co-operation of the municipal administration in enforcing suitable conditions as to sanitation, light, ventilation, fire protection, etc.; of the architects in making plans for convenient and attractive homes at moderate cost; of the building trades in getting these homes built; and of the Finance Committee in advancing capital and creating a corporation which will ensure the purchasers against fraud or injustice will solve the housing problem and nothing less than this co-operation will solve it. In closing his report, however, the Rehabilitation Committee and the Relief Commission alike wish to emphasize the fact that there is no intention that the relief fund shall become a providence of the refugees, solving all their difficulties and relieving them of all individual responsibility. On the contrary, it is confidently expected that each family will to the greatest possible extent solve its own problem, find its own capital, decide on the plans for its own house, discharge its obligations for any money advanced as soon as practicable, and that if these recommendations are adopted the entire business will be so conducted by the Rehabilitation Committee, the Executive Commission and the corporation formed for the purpose of acquiring land and building homes, as to preserve in full integrity the fundamental traits of American character, individual initiative and personal responsibility.

A group of expert workers in organized charity was called to San Francisco early in the summer from Chicago, Boston, Brooklyn, New York, Philadelphia and Baltimore to undertake the difficult case work in connection with closing immediate relief and with permanently rehabilitating stricken families.

Dairy Specials. Perhaps it was Dr. Johnson who was first called "an encyclopedia in boots." But many of the pioneer communities of the Middle West in the days when books and libraries were few, boasted of some one to whom the name was tagged and whose journeyings partook of the nature of an itinerant information bureau. Those who are looking for analogies can find one in such distinctly modern contrivances as the milk special which has played a part in the Maryland clean milk campaign. Dairy specials are not new, but this was the first one run in Maryland and meant to the outlying country districts what the milk show meant to the city people. The institution is a cross between a technical school on wheels and a political stumping tour; and the courses of instruction are minutes rather than semesters.

To describe this one—the milk special was organized by Director William R. Amoss of the Farmers' Institute, and Professor H. J. Patterson, director of the Agricultural College Experiment Station. First of all, the territory to be covered was thoroughly advertised. The itinerary of the train was announced and the names of the speakers, farmers being advised to meet the train at the points and times designated. The train carried two passenger coaches, and one of these was used as an auditorium car. The stop at each station was forty minutes. There were two speakers at each point. Each of them was to conclude his remarks in fifteen minutes, five minutes being allowed for the people to get into the car before the first lecture, and an equal time for the people to get out after the second lecture. In this way anywhere from fifteen to twenty-one stops were made in a day. This particular special covered the Western Maryland and Northern Central Railways—about sixty-five or seventy miles out from Baltimore. The speakers were Dr. John S. Fulton of the State Board of Health; Dr. C. Hampson Jones, assistant commissioner of health of Baltimore, and Jared Van Wagenen, a large milk producer of New York. As many as sixty people could be gotten into the car for the purpose of hearing a lecture. At some stations there were no more than twenty, but they were all farmers and milk producers. The talks were published in a number of local papers and in spirit and substance were of the sort which makes every word count. The purpose of the special was to tell the farmers of Maryland of the increasing demand for milk in Baltimore and of the necessity for greater care in the production of milk.

The Albany Prison Congress. This year's meeting of the National Prison Association will be held September 15-20, at Albany, New York, under the presidency of Cornelius B. Collins. A special effort is being made which should result in the presence of an unusual number of officials, representatives of state governments, members of boards, judges of courts, and others. The New York legislature has made an appropriation, Governor Higgins will deliver the address of welcome, Bishop Doane, the conference sermon, and altogether the plans are promising. Sunday evening, the 16th, a popular meeting will be held, to be addressed by former Governor Frank S. Black and Dr. Charles R. Henderson of Chicago. At the Wardens' Association Monday, Warden H. N. Jones of Fort Madison, Iowa, John P. McDonough of Albany, and R. H. C. Crawford, Chief Gaoler, Nassau, N. P., Bahama Islands, will speak. In the evening Mrs. Maud Ballington Booth will deliver an address. The Chaplains' Association meets Tuesday, with addresses by Chaplain Batt of Concord, Mass., and Chaplain Edgin of Jeffersonville, Ind., and with an address by Supt. Scott of Elmira Reformatory on *The Chaplain From the Warden's Point of View.* Mayor Z. R. Brockway of Elmira and Dr. Frederick Howard Wines will speak in the evening. Prison sanitation, the tuberculosis problem, and mental defect among criminals will be discussed at the Physicians' Association on Wednesday, and at the concluding general sessions Wednesday and Thursday strong reports and papers on practical questions will lead up to a popular meeting on Thursday evening. Further information as to the

conference may be obtained from Amos W. Butler, general secretary, Indianapolis, Ind.

The New Massachusetts Commission for the Blind.

In pursuance of legislation passed by the recent General Assembly, Governor Guild of Massachusetts has appointed a permanent commission for the blind. Its membership is of an exceptional order. In the first place, it includes Miss Annette P. Rogers, who did efficient work as a member of the State Board of Charities before she herself was afflicted with blindness. Through her own misfortune, she brings a valuable point of view to the problems with which this new commission has to deal. Again, a second member of the commission is Miss Helen Keller, whose life history is itself one of the greatest triumphs of education in this field. With these will be associated Dr. E. M. Hartwell of Boston, who was chairman of the temporary Commission to Investigate the Condition of the Adult Blind; Dr. J. H. A. Matte of North Adams, one of the best-known physicians in western Massachusetts; and Robert L. Raymond, secretary of the Massachusetts Association for Promoting the Interests of the Blind, and known for his work also as counsel for the Civic League.

The work outlined by the commission has been characterized as the sanest, most progressive and healthful plan which has been put forward to improve the conditions of the adult blind, and it is especially gracious that the state has called to its service in this field those who are themselves handicapped, as well qualified—in some respects better qualified than those with sight. It is significant also that the commisssion is largely made up of men and women identified with the newer movements in New England for the blind.

In a letter to Governor Guild, Miss Keller says:

> I cannot refrain from expressing to you my keen interest in the appointment of the new commission to aid the blind. It is an event charged with great meaning to all the sightless, and to their friends who have thought, planned and labored so earnestly for the betterment of their condition. At last my long hope is fulfilled, that the blind may be strengthened to master by the useful toil of their hands the calamity which has robbed them of their equality with their seeing fellow-citizens.

Placing the Handicapped.

Three months' experience in its new "Employment Department for the Handicapped" has convinced the Chicago Bureau of Charities that a special effort to place cripples and aged persons back into regular industry is eminently worth while.

One hundred and sixty letters were sent out to employers in lines regarded suitable for persons not normal physically or otherwise. Further publicity was given to the movement by the newspapers, which seemed attracted by its unique nature. Then came the applicants, the lame, the blind, the halt, by the score, some of them from the poor house; and the calls from philanthropically inclined employers, first slowly, then in rapidly increasing number. At first the coupling between the two was done rather crudely, owing to the pressure from both sides, but as nearly as possible the kind of man called for was sent out in every instance, this without special investigation and on a clear understanding with the employer that the Bureau could not give a full history of the man sent him. But since the initial rush ended, the aim has been to make a careful inquiry of the honesty, sobriety and ability of each person asking for special forms of employment, and to furnish a frank statement to the employer in each case.

The results thus far attained have encouraged the managers to such an extent as to lead to the determination to place the department upon a permanent basis.

The following figures relating to the work are not absolutely accurate, because of the lack of time to make a full and correct compilation but they are sufficiently sound to give a fair idea of proportions:—

Number of applications since May 1....	350
" different employers calling for workers	90
" situations offered by these employers	110
" persons sent to fill situations..	130
" persons who began work.....	98
" persons who refused positions, or were rejected by employers	32

The table indicates that something more than a third of all applicants were put at work, a proportion much higher than was expected. Of course, some of these will not "stick" or will not be kept by employers for one or several of many possible reasons, and will need to be replaced. So far eight men have been placed a second time. On the other hand, in a number of instances, word has been received from both master and man that each is well satisfied with the other and that a happy combination has been effected.

Some examples of the "couplings" made are these:

One-armed men—placed as doortenders and watchmen.
One-legged men and certain forms of rheumatics—placed at wiring together wax figures.
Man without arms—set up in news-stand.
Old men—placed with A. D. Telegraph Co., arranging call boxes and keeping tallies.
Old men—placed with department house as bundle checkers.
Deaf man with club feet—placed as an office letter filer.
Man without legs—placed as candy wrapper.
Old men of genteel type—placed as personal attendants to men invalids.

Expansion in Sociology at the University of Missouri.

Through the enlightened policy of the president and board of curators of the University of Missouri, the work of the department of sociology of that institution has been recently so expanded that it will be more nearly adequate to meet the needs of the state. It has long been the idea of President Jesse that the university should serve the social interests of the people as well as their material needs; that the work of the department of sociology should culminate in public service, just as the work in the physical sciences culminates in service to the agricultural, industrial, and other economic interests of the people. The present head of the department, Professor Charles A. Ellwood, has been in hearty sympathy with this policy, and has carried out important practical investigations in the almshouses and county jails of the state. With the appointment of Thomas J. Riley, who holds a doctor's degree in sociology from the University of Chicago, as an additional instructor, it will be more nearly possible for the department to carry out a state-wide plan. Besides giving additional courses on philanthropic and social work in the university, Dr. Riley will spend a large part of his time in university extension work along social lines. It is hoped, not only to establish university extension centers in Kansas City and St. Louis, for systematic instruction in public and private philanthropy, but to lecture in all the county seats of the state, on the proper management of local charitable and correctional institutions. Here Dr. Riley will work in co-operation with the Missouri State Board of Charities.

The Rand School for Socialists.

The Rand School of Social Science is the name of the pioneer academic undertaking in this country to teach political and social science from the standpoint of socialism. The school is located at 112 East 19th street, New York, and is made possible by the foundation bequeathed by Mrs. Carrie A. Rand. W. J. Ghent, author of *Our Benevolent Futilism,* is secretary, and a prospectus outlines the work to be taken up largely in evening courses. As this is the first concerted venture by radical theorists in the field of instruction other than through popular mediums, the working out of the curriculum is of rather unique interest.

Of systematic study courses requiring the use of text books, examinations, etc., seven are announced—history of socialism by Morris Hillquit, author of *The History of American Socialism;* an introduction to socialism by Mr. Ghent; a course on industrial development and economic theory by Algernon Lee, editor of *The Worker;* treatment of the more fundamental socialist theories in the light of recent data, by Lucien Sanial, author of the series of statistical socialist posters published by the International School of Social Science; a course on the evolution of the state, by Dr. Charles A. Beard of Columbia University. To improve the mechanics of propaganda there are two courses—composition and rhetoric, and elocution

and public speaking. Four lecture conference courses are announced, less academic than the first group—the first by Professor Franklin H. Giddings on the principles of sociology, the second on ethics by Dr. David Saville Muzzey of the New York School of Commerce, the third on social theories and movements, "anarchism, single-tax and reformism;" and the fourth on social history by Algernon Lee.

Formal lectures are announced on socialism and art by John Ward Stimson, George Willis Cook; on women and economics by Mrs. Charlotte Perkins Gilman; on proletarian diseases by Dr. P. A. Levene; and on immigration by Emily Greene Balch.

Members of the socialist party get a rebate on tuition—a discrimination which is respectfully referred to the Interstate Commerce Commission—and text books are furnished at cost.

The Hampton Negro Conference.

That the exhibit plan, which has proved so successful in milk shows, tuberculosis exhibitions, labor museums, and the like, can be put to widespread educational uses was shown by this year's Negro Conference at Hampton. The work of the conference includes the investigation of conditions, the popular presentation of facts, and the encouragement of reform efforts. This year's meeting was largely given over to the second line through the extensive use of exhibits and inspection tours to the farm, gardens, laboratories, and barns of the school. At every session there was a photograph, chart, or diagram presentation of the facts explained by the speakers. There was a model house for the delegates to examine and there were demonstrations as to improved methods in ventilating a room.

The general plan covered four topics: agriculture, housing, health and the minister, and in addition to these, three others were considered at round-table meetings. The subjects and leaders were as follows: *How Can the Women Help?* Mrs. Harris Barrett; *Insurance and Banking*, W. P. Burrell, and *Legal Imposition*, W. Ashbie Hawkins.

Dr. Frissell in his opening remarks urged that a note of hope for the future of the race might be sounded by the conference—hope based upon knowledge of remarkable progress already made and upon the determination to find a way or make it in the future. George Foster Peabody emphasized the importance of friendly relations between the colored people and the Southern whites, which he held will be much helped by increasing the efficiency of the working classes who are the one great class yet in touch with the white people of the South.

The men and women in attendance were about five hundred in number—farmers, teachers, lawyers, doctors, and ministers—who had come to exchange experiences in work in behalf of their people. In the plans for the coming year the work of forming local conferences is to receive special attention. Many of the delegates expressed their determination to arouse their localities to the need of concerted action for purchase of land, the improvement of the soil, the encouragement of education, the decrease of the death rate, the saving of money, and, "most important of all, the increase of righteousness in the hearts of the people." To this end the Hampton Conference plans to send its exhibits on housing, health, farming, and education, its free literature and its teachers, to any community which requests assistance in the formation of a local conference.

Of the resolutions passed, these may be quoted:—

Since the excessive mortality of the Negro population depends on causes which are largely preventable, it is the sense of the conference that more systematic efforts be made to disseminate among the people information on sanitation and hygiene, the proper care of infants, good diet, the evils of the drug habit, and the pernicious effect of the indiscriminate use of patent medicines and other flagrant violations of the laws of health, all of which are contributive causes of the high mortality.

Since there is no evil sapping the intellectual, spiritual, and physical strength of our people more than alcoholic drinks, be it resolved that it is the sense of this conference to lift up its voice in condemnation of the drink habit.

We encourage the formation of building and loan associations by the colored people upon the latest and most improved plans.

We encourage the establishment of banks in all of our communities where the popula-

tion will warrant it and urge the utmost care in the management of the same.

As a large proportion of the colored population must for years live by domestic service, we encourage the establishment of training classes for the different forms of domestic service in our localities and urge that every effort be put forth to raise the standard of domestic service.

We feel that Negroes should do all in their power in the way of organized charity and undertake systematic work to prevent crime. We recommend, therefore, renewed attempts at the organization of Negro charities and renewed interest in movements looking to the prevention and punishment of crime, the reformation of youthful criminals, and the improvement of the sanitary conditions of jails and poorhouses.

We urge the formation of land companies wherever practicable, under efficient and economical management. Where it is impracticable to organize land companies, we urge the organization of land clubs for the buying of land in groups.

The Public Duty of Public Service

Graham Taylor

To be a citizen is to do more than vote. To be a "good citizen" means more than paying your taxes and keeping out of a police court. There are many more duties involved in being a member of any civilized community, than you can be fined for not doing. There are many more obligations, imposed by it, than you will be arrested for defaulting upon. Most citizens have sense or selfishness enough, though some have not, to sweep their sidewalks clean, and clear them of snow, because they want others to do it too. Most householders feel bound to keep their garbage cans from being a nuisance to their neighbors, who in turn might annoy them, if they did not.

But public spirit is a public duty. To look to the general welfare is the part of good citizenship. To promote the greatest good to the greatest number is a human, not to say religious obligation.

While some of these specific public duties can be done better by others for us than we can do them ourselves, yet we cannot rightfully lay off the duty of having them done, upon them or anyone else. We cannot do our own charity by proxy. Whoever may spend the money more wisely than we, whoever can find out the real needs, and the needy who suffer, better than we, it is for each one of us, at least to be charitable, to see to it that the need is found out, and that the needy are relieved. We may subscribe to the charitable societies and funds, and we should do so as a public duty. But our duty to the public does not end there. Their agents are really more ours than theirs. What is done or left undone by others, we do or leave undone ourselves. Most of these societies have volunteer friendly visitors to see and feel for themselves, and "decision's committees" to decide what these agents of the givers ought to do. In Germany this friendly visiting is as much a part of the citizen's legal duty as serving on juries, or responding to calls to preserve the public peace. The citizen is drafted once in so often to assist what we would call our county agent or poormaster. We may be moved by pity for fatherless and motherless children to support orphan asylums. But our duty to the orphans and to the community is not done then. We should satisfy ourselves that the good care they get when little, be extended to them as they get older, and follow them to the home and work in which they are "placed out."

You have a glow of kindly feeling, not to say pride, when the blue garb of a visiting nurse, or the black habit of a sister of charity flit by you as these ministrants of mercy pass on their errand of healing. But why is the burden of the sufferers to whom they are going upon them, or those who support them more than upon you? Your own parlor or club may throw less of a shadow on your heart, because you know of the bright neighborhood centers in the less privileged places, which cannot be accounted for except by the toil and sacrifice of others. But should the shadow lift until you ask yourself why you are not one of them, to join heart and hand on the equal terms of giving and taking, with those who only want help to help themselves?

We can get some impulse and training for public duty through personal experience at these points of contact with human need. But should we not want to do it more quickly and on a broader scale? Should we not want to know what others are doing, what their ex-

periences have been, how their successes or failures have come about? Should we not want to fit ourselves to take our own part effectively in such volunteer public duty? If adapted to do so, should some of us not aspire to train ourselves to enter the service of the state or city institutions, under the guarantee of an honorable and public position, open in the order of examination rank to the eligible list of applicants? Or cannot more of us prepare to discharge the sacred trust of private or church charities as their paid or volunteer administrators? Having a public spirit is an obligation to put it to use in public service.

Here's to Oregon!

Florence Kelley

News of unusual importance comes from Oregon. The supreme court of that state has sustained the statute which restricts to ten hours the working day of women in mechanical establishments. A case against a laundry proprietor, charged with requiring his women employes to work longer than ten hours in one day, has ended in the decision by the court that the law is constitutional. The peculiar significance of this decision, at this moment, lies in the fact that there is pending in the courts of New York a case, which will ultimately reach the Court of Appeals, involving the question whether it is constitutional to prohibit the employment of women after ten o'clock at night in manufacture.

Every decision by a court of last resort in any state dealing with this problem at this time must either confirm—as does this Oregon decision—the old established, humane, precedent of Massachusetts (in the case of the Commonwealth *vs.* the Hamilton Mfg. Co., 1876) upholding the statutory restriction upon the working day of women in manufacture to ten in twenty-four; or it must sustain the reactionary and cruel decision of the Supreme Court of Illinois (Ritchie *vs.* the People, 1895). There is no third choice. The Illinois precedent has, happily, not been followed in any case known to the writer. It remains alone, awaiting reversal by a court of more modern mind than that which has left the working women of Illinois for eleven years at the mercy of every employer who has chosen to require them to work unlimited hours on pain of "finding some other job."

Every person interested in the health and morals of working people will rejoice over the enlightened decision of the Supreme Court of Oregon.

The Milk Campaign in Maryland

H. Wirt Steele
Secretary Maryland Association for the Prevention and Relief of Tuberculosis

The awakening on the part of a considerable portion of the public of Maryland to the consciousness that each citizen is in some measure his brother's keeper; the quickening of the civic conscience in a large group of people explains the movement which brought about the recent series of lectures on the production, distribution and consumption of milk and the Maryland Milk Exhibition which followed them in Baltimore.

Two and a half years ago some two hundred citizens of Maryland learned the great lesson of their individual responsibility, and the value of working together, in an effort to solve questions affecting the health and living conditions of the people. At that time they worked shoulder to shoulder in holding the Baltimore Tuberculosis Exhibition (the initial effort of its kind in the United States). Its success in awakening popular interest and in helping shape public opinion, impelled the leaders to pursue the idea still further. A tentative program of public education embracing numerous subjects which vitally affect the public health, physical and moral, was laid out.

The subject of milk supply seemed to be the one most closely related to the tuberculosis problem in many ways, and it was deemed the one which most naturally should receive consideration next. The lectures and subsequent exhibition were attended by several thou-

sand people representing various groups, such as public officials, dairymen, milk dealers, physicians and nurses, and laymen.

Just what results may come from this campaign it will take time to develop. Unquestionably public officials learned the necessity for a more rigid inspection of the milk supply. Up to this time such inspection by the state or municipality was shown to have been inadequate. Without any additional legislation the State Board of Health of Maryland will soon begin gathering information concerning the source of supply throughout the state. The Department of Health of Baltimore city has already begun a systematic bacteriological test, although no standard has yet been fixed by ordinance. From these investigations may be expected some definite and adequate program of supervision later on.

The educational gains of the campaign thus far seem to have been shared by dairymen, physicians and nurses and the lay public. Dairymen throughout the state are reported to be engaged in bettering the conditions and care of their stock and the handling of their milk.

Physicians and nurses learned a great deal about milk, more especially in its relation to infant feeding and infant mortality. Physicians, especially, are demanding more so-called "certified milk" than has been or is now produced in the state. The effect of this demand will probably result in the organization of a voluntary medical milk commission.

The average layman is taking more thought concerning the milk which he uses than he ever did before. He is questioning his milk dealer about any milk which appears to be under grade. In short, he is fixing an arbitrary standard of cleanliness and purity which will eventually force producers to supply clean milk at a reasonable price.

Like all educational movements this campaign for clean milk will eventually produce results as yet not dreamed of; but on the whole, perhaps the most desirable thing which has been gained is the strengthening of the co-operative relations in the group of people who were responsible for the movement.

IF SHE WOULD LAY THE HORN ASIDE FOR A MOMENT—

SHE MIGHT BE ABLE TO HEAR THE CHILDREN'S CRY.

THE CHICAGO DAILY NEWS.

A Model Nursery.—Here is illustrated the appropriate furniture for an infant's apartment. It is not an attempt to show a model nursery, but rather to show what range of choice is afforded in the furnishing of such a room. The white covered object at the lower right hand corner is a home-made crëche or incubator for premature infants. This exhibit and the one previously described were under the control of a special committee on infant feeding, consisting of physicians and nurses.

An Infant's Milk Dispensary.—In this corner of the Donovan Room in McCoy Hall an Infant's Milk Dispensary was installed, and every day during the Milk Exhibition instructions were given by a corps of physicians and nurses concerning the feeding of infants. Just outside the dispensary seats were placed for an audience of twenty-five or thirty women, and a clinic was held every day, infants being brought to the clinic from the nearby dispensaries. The necessary apparatus for preparing infant's milk are arranged next to the wall on the left of the picture, and scales, a sterilizer, and some other apparatus on the table just to the right of the center. A long showcase just outside of the dispensary rail contains a collection of proprietary infant foods. At the rear of the room is seen a small part of the exhibit in chemistry, and the closed door opens into the exhibit on Pathology and Bacteriology. The screen on the right of the picture divides the Milk Dispensary from the Model Nursery, which is described in the next picture.

The Baltimore Milk Show

The right-hand half of this picture shows the Exhibit of the New York City Health Department, including the model of a dairy barn, cast in plaster. Part of the Baltimore exhibit is visible on the wall above this easel. The large object just to the left of the center carries three drawings of a model dairy barn as planned by the United States Department of Agriculture. The easel at the left of the picture shows a small part of the exhibit from Schools of Dairying.

A Part of the Exhibit in the Chemistry of Milk.—Demonstrations were given here daily during the Exhibition by a committee of chemists and physicians.

This collection of pictures, toys, and other objects illustrates the dairy customs in many parts of the world. Beyond the screen in the center of the picture are found the exhibits of certain American cities. Boston, St. Louis, Philadelphia, Rochester and Cincinnati. The screens at the far end of the picture show one end of the exhibit in the statistics of milk and milk products. The pictures illustrating the dairy conditions in and around Baltimore were on the opposite corridor wall, and are not seen in the picture.

Apparatus and Milk Products.—The easel on the left of this picture carries photographs of a number of model dairies. Beyond this one sees a collection of milk cans, milking pails, and other dairy utensils. The nearest table in the center shows a collection of milk bottles which have been more or less badly used by consumers. The next table beyond carries the approved utensils for the domestic care of milk. The next table beyond carries a large collection of cheeses. Beyond that is a large table on which was displayed part of the exhibit in the technical uses of milk. The table and screen in the center at the rear contains an exhibit of dairy foods, and at the left of this there was an exhibit of Von Behring's Bovo-Vaccine. At the right of the picture one sees certain approved forms of separators. The poster partly shown on the extreme right of the picture marks the entrance into the model kitchen where daily demonstrations were given on the culinary uses of milk.

The Laboratory of the Pathology and Bacteriology of Milk.—Demonstrations were given daily in the afternoon and evening in this laboratory by a committee of pathologists and bacteriologists. One-half of the microscopical shelf is seen at the upper right-hand corner of the picture, the window curtain being drawn down. The row of test tubes seen on the table in the foreground contains specimens of a great many cheese molds and an extensive collection of the bacteria of milk, butter and cheese, and of the microscopic organisms which produce anomalous, or poisonous, or infectious milk. The glass dishes at the farther end of this table are plate cultures showing the bacteria found in milk, and in the air of barns, stables, and milk houses. On the near end of the farther table one sees the apparatus used by the Philadelphia Department of Health in determining the bacterial quality of milk. The specimen jars beyond contain a variety of pathologic specimens. A more important collection of pathological specimens in the same room is not shown in the picture. The two shelves of jars in the upper left-hand corner of the picture show the daily per capita consumption of milk in forty American cities. The actual amount of milk is in each jar.

What the Public Ought to Know as to Milk

John S. Fulton, M.D.
Secretary, State Board of Health of Maryland

[This was the introductory lecture in a course of ten given under the auspices of the Maryland State Board of Health, and outlining the general scope and purpose of the investigation entered upon by a group of citizens. These lectures led up to the milk exhibition. They are printed on the following pages in abstracts prepared especially to meet the needs of the lay reader in an appreciation of the problems of milk supply.]

Some time ago a talented Boston woman, a writer of more than local fame, called on a distinguished hygienist seeking authoritative information on pure foods. She professed a lively interest in this subject, and the hygienist responded with great enthusiasm. He said that milk surpasses all other foodstuffs in its potency for good or evil, that a considerable part of the current sickness and mortality of Boston is due to bad milk, and that a great many lives, particularly of infants, would be saved if intelligent people, women especially, would inform themselves fully and would exert their influence to improve the milk supply of Boston. The lady's enthusiasm for pure food did not survive this brief discourse on milk. "I don't drink milk," she said, "and I am not interested in babies. Tell me what you know about lemon extract."

Sensational misinformation about food adulteration so abounds in the public prints at this time that this inquirer would not have been surprised, perhaps, if she had been told that the most popular brand of lemon extract contains very variable amounts of prussic acid. All over the country statesmen, journalists, medical societies, and women's clubs are crying out against the slaughter of Americans by means of spices, catsups, jellies, and flavoring extracts. The people of Maryland, so far as I know, are not excited about their foods, but they have selected one very important article of diet for thorough and sober investigation. We are going to study milk for a period of ten weeks or longer.

My acquaintance with the causes of sickness and mortality in Maryland does not enable me to commence this course of lectures with a sensational statement. My first proposition is that milk is nearly, if not quite, the most important single item in the dietary of mankind, and the second is that under certain conditions milk is a potent carrier of disease and death. Of the particulars comprised in these two general statements a few are known to me and another few are known to you. Collectively we perhaps know enough about milk to guess at some of the results which may follow this investigation. But I am convinced that it always saves time and often prevents disappointment to begin a work of this sort without any pledges or preconceptions as to the outcome. I begin this course with a confession of voluminous ignorance and robust curiosity, and I ask no better preparation than this for myself or for you. If the spirit of inquiry continues with us for eight or ten weeks, we shall know more about milk than we do now—enough, perhaps, to offer suggestions of substantial value to the whole people of Maryland.

We must be prepared for surprise at every step. If we begin by asking what is milk, our first surprise will be a disappointment, for a chemist has one answer, a physiologist another, a dairyman another, a hygienist another, and the compacted truth of all their answers would not satisfy an intelligent cow. If we ask the price of milk, one man says six cents, another eight cents, another ten cents, and so on up to thirty cents a quart, and at the top of the scale is the amateur dairyman who does not sell his milk at all, though you may drink some of it if you prefer milk to a very superior champagne which costs as much. To ask the price of milk and to expect a specific answer is about as rational as if one should call up an art dealer and

ask the price of paintings. We have discovered, however, that the term milk is generic, and that any specific price must relate to a kind of milk.

The kind of milk which especially interests us is market milk, the kind of milk which reaches the greatest number of consumers. The price of good market milk is one of the things which we ought to know. Here we shall encounter a rooted preconception which must be challenged at the outset. It will be agreed that it costs more to produce better milk than to produce merely good milk, and to most people it seems axiomatic that to improve the general milk supply is to advance the price of milk. But even when the factors which determine the cost of milk are known, it is probable that consumers and dairymen would agree as to their weight.

The price of milk includes everywhere the value of land, the cost of dairy cattle, the cost of housing and feeding, of milking, package, transportation, and distribution, every one of which items varies from time to time and from place to place. Besides the variable factors which the price of milk must cover everywhere, the price of milk is influenced by other conditions which are strictly local. Thus the price of milk is influenced in one place by the proximity of large creameries, at another place by condensed-milk factories, at another by the manufacture of oleomargarine. In other cities the price of milk varies from time to time, and the best farmers cannot make contracts to deliver milk at a fixed price for a twelvemonth. Many dairy farmers have no city contracts, but sell their milk at the station, or the station-agent may simply ship the milk on commission, not knowing at the time what the price will be or who the buyer.

Elements Entering Into Price.

It is worth while to know what determines the price of milk elsewhere in order to show whether the price of milk in Maryland is fair. If the Maryland dairyman says that cattle are dear, we may say that in Pennsylvania they are dearer, being tuberculin-tested. We can say, moreover, that dairy cattle are relatively cheap in Maryland, because rejected cows, rigidly excluded from the dairy herds of Pennsylvania and Virginia on account of tuberculosis, are bought at low prices by Maryland dairy farmers. The dairy farmer may then reply that if such cattle are excluded from Maryland the price of dairy animals will advance. He follows up this argument by saying that he is forty miles from market and transportation is expensive. We shall say in reply that many New York dairymen are 400 miles from market, and have to pay for ice, as the Maryland dairyman ought to, but does not. The dairyman replies that ice is dearer here and the warm season is longer. To this the rejoinder is that farm buildings are more costly in the North, the cold season longer, and the pasture season shorter. This brings up the question of foods, and the dairyman says that feed is more costly hereabouts. Partly true, we admit, but the Maryland dairyman, near Baltimore at least, can buy an abundance of the cheapest sort of food—and a great milk producer, according to some accounts — namely, distillery swill. The good milkman declares that he will not sell swill milk of any sort, and he is sure that his customers do not want to buy it. He says that the market would be a good deal better if the winter price would hold the year round. In winter, when his cows are not in full milk, the price is good enough, but in summer he cannot find sale for all his milk, and is obliged to feed much of it to his farm animals. The consumer wants to know if the price of market milk must cover the unsold excess milk of summer. Of course it does, and the consumer suggests that the unsold milk must have some value as a food for farm animals, and in any event the consumer should not pay for it, because he receives no benefit out of this over-production. The consumer is benefited, however, for the Maryland farmer has a rule of thumb by which he makes sure that his summer milk will never fall below the butter-fat standards. This method is to make up the last three or four gallons in each can by adding top milk from the cans which

he expects to retain on the farm. The superior richness of the top milk thus added gives the consumers a very rich milk, having a fat content amounting often to 6 or 7 per cent., or even more. This interesting news does not strike all consumers alike favorably. There are unreasonable physicians who seem displeased by the information that the infants and invalids whose nutrition they regulate get a summer milk which is greatly enriched in its cream content and seriously confuses their diet prescriptions.

The argument that the summer milk is considerably more valuable does not appeal to the consumer quite as was expected. He wants to know why the dairymen around Philadelphia do not complain about the summer price, and the Maryland dairyman can answer that. He says that the Jersey shores are thronged with people, affording the Philadelphia market a fine outlet for surplus milk all summer long. But the fact is that many American farmers who formerly produced four gallons of milk in summer for every gallon which they could produce in winter now produce two gallons of summer milk to one of winter milk, and in the dairy countries of Europe the pressure of necessity has taught the farmer to keep the seasonal variations of his milk yield within much narrower limits. The pressure of necessity might teach the Maryland farmer to do the same thing, and he might under the same stimulus learn also how to support more animals on less land.

We want to know what profit the dairyman expects a cow to yield, and the usual answer is that the profit depends on the size of the herd. That, of course, is nonsense. The profit depends on the performance of the individual cows, and can be increased by eliminating the cows which do not yield a reasonable profit. If the Maryland dairyman does not keep an account with every animal, it is because his ambition is low enough or the price of milk high enough to compensate for the want of that much sagacity. Clever farmers credit to each cow every ounce of her milk and every penny worth that she adds in any way to the revenues of the farm. The debit side of the account includes every penny of expense. If the profits can be increased by accurate accounting when the price of milk is high, surely losses can be prevented by accurate accounting when the price is low.

The price of milk, so far as we have analyzed it, includes a number of elements over which, as we believe, the farmer does not exercise the intelligent control which would be necessary if his business were more sensitive to healthy competition. The consumer recognizes that several factors enter into the price of milk, but does not consent to the farmer's statements concerning their weight. When we look a little further into the elements of cost we find that each item is capable of subdivision. In discussing food materials, for instance, one is not convinced that the available resources are thoughtfully used in feeding dairy cattle, though steadily increasing cost of the staple foods would seem to be a sufficient stimulus to the study of dairy rations, and one must admit that if the price of milk was fair with the cost food at the relatively low figures of a few years ago, the price of milk must be ruinously low at present. We may assume, unless otherwise informed, that in housing his cattle the average dairyman is governed by the standards fixed by the laws of Maryland. These prescibe a minimum allowance of light and air space and a certain decency about the removal of refuse. If we suggest that hay should not be kept in the loft above the dairy cattle, that non-absorbent floors are desirable, that cows should not be milked in their stalls, but preferably in the open air or in a room built for that purpose; that open cans should not be brought into the barn, that milk should not be cooled in the barn or in a room where feed is kept, these sugestions, we must admit, involve considerable expense to the farmer and justify an increased price, if the price of milk under existing conditions is no more than fair.

Under the item of labor we shall perhaps find that grooming of the cows is not included, nor a change of clothing for the milkers, nor any considerable

personal ablution, or washing of cans or of cows, and if we like a pretty thorough sort of cleanness in these operations we must agree that the extra expense is worth a little more than the ruling price of milk, provided that price is fair.

The Dairyman's Argument.

If we press for all the reforms which seem desirable without admitting that a substantial advance in price is likely to follow, the dairyman has an argument that may turn the tables on us. He may say:

Why should a farmer do these things? The middleman, the dealer, can befoul milk as thoroughly as anyone else. His way of examining the milk is to taste it. He dips into a can with a cup or a dipper and takes a little of the milk into his mouth. He does not swallow any milk, but spits it out, and goes from can to can with the same cup, repeating his performance. Some of them do not need a cup or a dipper. Two or three fingers dipped into a can will bring out enough milk to settle a dealer's doubts about the quality of the milk, or, if a larger sample is required, it can be taken out in the hollaw of one hand. The hand is a leaky vessel, and one prefers that it should leak anywhere rather than over one's clothing. It might interest you also to see the bottles washed, filled and capped. This operation can be seen without visiting a city dealer's establishment. People in the alleys can sometimes see the bottles filled by the wagon driver from a large can in the wagon, and some say that the empty bottles recovered from one back fence are refilled and deposited on the fence next door. Why should the dealer be overparticular about his bottles? One milkman is as good as another to the average consumer. The kitchen people choose your milkman. He leaves milk on the fence in the morning before you are up, and again in the afternoon, and there it sits till someone thinks of it. The garbage man comes along and makes one kind of a mess and the ashman makes another. The sun shines and rain rains on good milk as well as evil. The servant who goes out with garbage or ashes brings in the milk. She pushes the cap into the bottle with a fork or a skewer, and fishes it out with her fingers or else leaves it in the milk. She pours out what she needs and puts the open jar with its exposed contents into the refrigerator with bananas, soup herbs, and other alimentary odds and ends. You see the bill when it is presented, and you don't want the price to be over eight cents a quart. You want the milk to remain sweet for 12 or 18 hours, in spite of your way of handling it, and the milkman will arrange that for you, if the farmer has not done so, by adding a little of a liquid refrigerant which is at present very popular among undertakers. You see the milk on the table, and if it is not yellow you complain to the cook. The cook tells the milkman, and he stains your milk just the shade of yellow that you require. You never see the bottles. The sediment at the bottom might interest you, and you might like to know whether it consists of city dirt or farm dirt, though there is no important difference, and the chances are that both sorts of dirt are present. The empty bottles go back to the milkman with an odor of coal oil or of vinegar or with a suspicion of syrup, and the milk cans sometimes bring back to the farm a peck or more of coal ashes and potato peel.

If the farmer in this breezy summary has honestly characterized the milk business, one must believe that market milk may be produced in accordance with the laws of Maryland as to the housing of cattle, may conform to the chemical standards for normal milk, may be free from every sort of wilful or fraudulent adulteration, and yet be such a substance as no housekeeper would buy nor any honest man offer for sale, except that the nasty business has been legitimized by traditional indifference and ignorance on the part of both buyers and sellers. It seems reasonably clear that market milk ought to be clean. If so, it must be drawn from clean animals by clean hands into clean vessels, it must be put into clean containers, transported and distributed by clean methods, and must be kept clean from the moment of delivery until it is taken as food. Clean people, and clean ones only, must handle this delicate liquid at every step from the farm to the table.

The cost of cleanness is a part of the price of milk, and we want to know the price of clean milk. The oldest test of cleanness, and one of the best, is the age at which milk sours. The very dirtiest milk will not sour at all if a few drops of formaline are added to each quart, but none of us want embalmed milk even though it be clean. The dirtiest milk will keep sweet for several days if it be thoroughly pasteurized, but very few of us want cooked milk even though it be clean. The price of clean raw milk appears to be our specific inquiry. Several American dairies have produced raw milk clean enough to stand a voyage across the ocean and to be served as sweet milk

to consumers on the other side. Many people in the United States are willing to pay from twenty to thirty cents a quart for such milk. At the price this is hardly market milk, and we must amend our question again. What is the price of raw milk clean enough to keep sweet in the consumers' pantry two days? That is what the Maryland farmer must answer. All I know about it at present is that in one place it can be bought for twenty cents, in another for fifteen cents, in another place for seven and one-half cents, and in still another, as I am informed, for six and two-thirds cents per quart. I believe, moreover, that in all these places a clean raw milk is sold only to those who have been educated up to the point of demanding such milk, and that in proportion as that particular kind of education spreads among the people the price of clean market milk will more and more approach the price of dirty milk.

Of General Purposes.

The purpose of this investigation is, then, to find out whether it is possible to bring within the reach of everybody in Maryland the kind of milk that a few of us are clever enough or rich enough to buy at present. We can accomplish this purpose by distributing either money or knowledge. A few handfuls of coin would not carry us very far, nor a few headfuls of information. Our results will be proportionate to our resources of either kind, but we must work with information, and in that kind we can make our capital practically unlimited.

I have not disguised the fact that your health officials do not know enough to suggest wise laws for the sanitary control of market milk; I have indicated that milk producers and milk dealers do not know enough to meet a rapidly-growing demand for much better market milk, and I have offered the unflattering suggestion that consumers do not know enough to buy milk intelligently. As to the amount of knowledge available to milkmen and consumers in their relations to this problem, my estimate is subject to correction. But when I say that the State Board of Health expects out of this investigation to build up its own knowledge into something adequate to the needs of the public, that is not a matter of opinion, but of fact. If anyone thinks that we should make this investigation on our own account and without inviting the general public to participate in any other way than as beneficiaries, I have only to say that public business is public, and that the most efficient public servants are those whose duties lie in fields familiar to their masters—the people. The weight of enlightened public opinion determines the quality of every public service, and the results are never satisfactory except when efficiency in public office is supplemented by intelligent private practice. The business of public hygiene in this country is so new that no great mass of enlightened public opinion is brought to bear on its progress. Its chief men are only amateurs, coming into leadership *per saltum,* and not *per gradum,* restrained by no traditions, governed by few precedents, uncertain of their technique, and needing, more than most public servants do, the help of their masters.

I have convinced you, I hope, that we are not prepared to answer at this moment the simplest of the questions confronting us, namely, what is the price of milk? Nor can we answer better any of the other questions which must be asked in the course of our investigation. Every available source of useful information must be made tributary to our inquiry or we may make only a trail where we intend to build a road.

In 1902 the Tuberculosis Commission of Maryland, an official body made up of men who had no previous experience in dealing with problems of public hygiene, proposed to study tuberculosis in just this fashion. The people were invited to join them, and they did so, some hundreds. Personally, I have never seen a spectacle so remarkable nor any so inspiring. I think the results of that experiment were not foreseen by anyone, though 200 persons at least believed that the rewards would be ample. No one supposed that our frugal spread would prove enticing. But the people were hungry, and thousands were fed. I think the miracle of the loaves and fishes was

repeated here in 1904. That show is two years past. Its outward and visible signs disappeared very quickly, but the people are still nourished by the fragments that remained, so that there is hardly a village in this Commonwealth which has not laid hold on the faith that tuberculosis can be and will at least be mastered. Now the subtle power that spread this saving faith, and that not on wings of fear, but on feet of knowledge, resided in a company of about 200 persons who first received the word with gladness and made it, as I have said, virulent, so that it spread like a kind pestilence at every contact.

Municipal Milk Work in Rochester

George W. Goler, M.D.
Health Officer of Rochester, New York

In the discusssion relating to pure foods and food adulterations little or nothing is heard of milk and its dangers. Every baby must have milk, that opaque, whitish, more or less creamy fluid, with an odor frequently suggestive of the barnyard, and often more valuable as a food for calves or pigs or for fertilizing material than as a ration for babies.

This great food supply comes to all the cities and towns and hamlets of our great country from thousands and thousands of farms, and to the average householder has the following recommendations: It is to be found in most places in large quantities; it is cheap, sold at a price that has become fixed; it is white, or nearly so, and it has a reputation for its nourishing qualities. It is usually sold by a man whose every movement exhales an odor of cow stables, whose utensils would for cleanliness hardly find a place in a fairly well-ordered kitchen; yet this man brings in his wagon and in his utensils the food we give to our babies, to our sick, and of which we ourselves to some extent, partake. Were the milkman who serves milk to you clean, were his utensils clean, and he should dare to charge even as much as one additional cent per quart for his product, the housekeeper would get another milkman. So he remains dirty because he cannot afford to be clean. It costs money to adopt cleanly methods. This man may have cleanly instincts, but his customers compel him to remain dirty. Have you ever observed the milkman, your milkman, at work, seen him wash his cans, measures, bottles, etc.? The average man does it about in this way. He gets a washtub of water. It cannot be very hot, because hot water would coagulate the old milk caked on the can or bottle. In this water he swirls the bottles, cans and things around, rinses them in another tub of more or less hot water, and then stands them up to drain in the dairy-house. Frequently this dairy-house is near the barn, and there the things stand until they are filled with milk, when they are more or less tightly closed and more or less perfectly cooled. Where does the man get the milk he puts in his cans or bottles? Do *you* know? Does *he* know? In a great many instances, while the milkman knows the place from which his milk came, he has never seen the barns or stables, knows nothing of their cleanliness or, save in a business way, the man from whom he purchases his milk. Frequently the man buys milk from a farmer whose premises he has never seen. Occasionally it comes from his own little place in the suburbs. In either case the milk most frequently comes from a close, cobwebby, dusty, undrained barn, containing fly-tormented cows in summer or darkly-housed filthy cows in winter.

Your milkman uses a strainer. Why? He uses a strainer to strain out the large particles of filth. The smaller particles and the soluble filth, of course, find their way through the strainer into the milk that we feed children. Where does the man store his milk between the time the cows are milked and the product is delivered to his customers? Does he keep it in the barn behind the cows? In winter he frequently keeps his product in the pantry off the kitchen. Should he have diphtheria or scarlet fever in his family,

what is to prevent these diseases being carried to the babies in the city, not to mention the intestinal diseases that may be caused by the filth and bacteria usually contained in the milk? In summer he may keep the milk in the springhouse, and if typhoid excrement obtains access the city customers not infrequently suffer.

All this, and more, occurs day after day and year after year in thousands upon thousands of instances, for you compel milkmen to be dirty, because you are not willing to pay a living price for milk. You are willing to jeopardize the baby's health rather than pay a living price for milk, and thus enable the milkman to be clean. Until the people are willing to pay a better price for milk they cannot expect to obtain milk fit to feed little children. According to the statistics of men in the agricultural experiment stations, many farmers are keeping milch cows at a loss. Until you are willling to pay for clean milk, until you are willing to pay for having milk inspected as it should be inspected, you will get a prodduct having a high fertilizer and a low hygienic value, and you and your children will suffer disease and death as a consequence.

The Rochester Experience.

In Rochester we have tried to insure that all our citizens shall have an approximately clean milk supply. It is my purpose to tell you why and how we have accomplished this work. We have a population of 185,000 people. We receive 75,000 quarts of milk daily from 700 farms lying within a radius of 60 miles in three directions. This milk is distributed by 225 retail dealers licensed at $2 each. In our city there are approximately 5,000 births per annum, not all of which are reported. If 4,000 of these babies live, we then have at all times between 15,000 and 20,000 babies under five years of age dependent for the most part upon milk as food. Take these figures as a basis for your city. Think upon the thousands upon thousands of lives dependent upon milk as food. How much are you willing to pay for this food? How much does your city pay for milk inspection? Are you willing to find out what your city pays, what your state pays, for inspecting milk, and if you find they do not pay enough, are you willing to do your duty as citizens by insisting that sufficient money be set aside for the inspection of farms and dairies from which this food supply comes and for the maintenance of a sufficient chemical and biological staff to examine this food supply? Will you insist upon the work being well done? After an examination of municipal milk work similar to that conducted by us during the summer months I think you ought to be willing to establish milk stations at least during the summer either at the cost of private philanthropy or at the expense of the municipality. Our municipal milk stations, four in number, with a portable laboratory on a farm, are established for two months each year in order that we may safeguard the lives of more than 15,000 children under five years of age. We began our work in a rough way nearly ten years ago. What we have been able to accomplish we can only show by the figures demonstrating the great decrease in the number of deaths from all causes, both during the summer months and for the whole period. We cannot, of course, show the effect on the health of the children whose lives have been saved through this work. In attempting to show what we have done we do not deal with estimated populations, percentages of population, or causes of death from intestinal diseases alone. We take all of the deaths from all causes that occur under five years of age, for we assume that every death in a child under five years of age was, in part at least, due to the dirty character of its food.

Total deaths under five years of age, 1888-1896	6,629
Total deaths under five years of age, 1897-1905	4,403
Total deaths under five years, July and August, first period, nine years, without municipal milk stations	2,005
Total deaths under five years, July and August, second period, nine years, with municipal milk stations	1,000

The beginnings of the milk stations in 1897 were on a very primitive scale. Only $300 were required to begin this work the first season. The services of two nurses were donated by two of the

hospitals—one nurse for two months and one nurse for one month. A store was rented in the most populous part of the city, fitted with the necessary running water, gas stoves, counters and shelving. To this store milk was brought, pasteurized by the nurse, cooled and sold at cost, and little pamphlets entitled *How to Take Care of Babies,* and printed in four languages, were given to mothers who came to the stations for milk.

In 1900, when we paid particular attention to the cows and sterilized all of the utensils, we ceased pasteurizing, established a clean-milk plant upon a farm, extended our inspection work so that a large number of samples were collected to determine their nutritive value, began the systematic collection of samples to determine the bacterial content in milk, began the agitation for the establishment of a count not greater than 100,000 bacteria per cubic centimeter as a standard for city milk, and with the aid of the Rochester Academy of Medicine established a milk commission for certified milk.

The General Scheme of Control.

Our general milk work may then be divided into (a) obtaining and examining 4,000 to 5,000 samples per annum for nutritive value; (b) in 1905 obtaining and counting approximately 1,000 samples of milk for bacterial content; (c) inspection of dairies and stables for cleanliness; (d) registering against the name of each milkman the number of families with infectious diseases to whom he supplied milk, so that the danger of the milkman's carrying scarlet fever, diphtheria, or typhoid fever to his customers may be minimized, through ordinance and license endeavoring to educate the milkman, and, when this fails, compelling the better conduct of milk production and distribution, and by organizing a milk commission for certifying milk.

In the beginning of this general milk work there were found very many dirty cows and many dirty stables both in the city and in the country. To the average milkman straining the larger particles of dirt out of the milk, whirling it out by a centrifugal machine and then pasteurizing it, soluble dirt, micro-organisms and all, appears necessary. These things, while they make the milk keep longer, of course make it more difficult for babies to digest, but nevertheless a silver-plated centrifugal machine and a pasteurizing or sterilizing apparatus with bright metal attachments appeals more strongly to the milkman as a way to escape having sour milk than more simple and more cleanly methods in dealing with his barn, his cows, and his utensils.

The ordinary milkmen do not realize that pasteurized milk, while having a low bacterial count, generally owes its low bacterial count to the deaths of countless millions of the more harmless micro-organisms, while leaving more dangerous organisms to multiply. The matter of cleanliness such as is used in vaccine stations, the use of aseptic methods such as protect in vaccine laboratories, and the immediate cooling of his product to below 50° F. appeal to him less strongly than copper and nickel apparatus and the exhibition of a ball of dung and hair from the milk as an argument in favor of the use of the centrifugal machine through which dirty milk passes to be sterilized.

These notions on the part of the milkmen are difficult to combat, but we have sought, first, long and patiently to teach, and, failing in this, to compel, through arrests, fines, and the revocation of licenses, more cleanly conduct of the establishments supplying our city with milk.

Our milk work is carried on during July and August in a portable laboratory, set up each year on a farm selected for the purpose. We contract with the farmer for milk at four and one-half to five cents per quart. The plant consists of a portable house, from which a long platform extends. The house is used as a preparing and bottling room. Outside the house, under a tent fly, a sink and running water are supplied. Here the bottles are washed. Next, beyond the bottle-washing plant, is a sterilizing tent. Here sterilizers are mounted upon oil stoves, each sterilizer holding two gross of nursing bottles. Beyond the sterilizing-room is the tent where the nurse

sleeps. The nurse boards with the farmer, or may, if she wishes, provide her own board.

Milk is received at the portable laboratory each morning, diluted in four dilutions, bottled, iced, and shipped to the four stations, where the milk is sold as has been described.

It is our belief that most babies become sick because they are infected by the bacteria and poisons of stable manure contained in dirty milk, and that to keep children well it is necessary to protect them from the dirt in milk just as much as we would protect them from diphtheria or scarlet-fever infection. Aside from the work done to insure that milk shall have a nutritive value, as provided by statute; that it shall have a low bacterial content, as indicating a minimum amount of stable and barnyard contamination; that infectious disease may not be brought to the consumer through sickness either on the premises of the wholesaler or retailer, our municipal milk stations have been established as demonstration plants from which the public may learn through the press, through our pamphlets, and from our nurses the value of clean milk to the child. Further than this, with the aid of the Rochester Academy of Medicine, we have certified to the milk of those dealers who give us assurance that for a living price, a few cents additional charge, they will furnish clean milk for those willing to pay for it.

We have done these things at a cost so low that it is hardly worth mentioning. Aside from the expense of the work of the Health Bureau, which any city may well afford; aside from the expense of the milk commission for certifying it, borne by the Rochester Academy of Medicine, the cost of this work for our city of 185,000 has averaged about $1,000 a year.

More Work to Be Done.

There is, however, more work that may be done. In a great city, with its tens of thousands of children, the problem of clean milk is much larger than it is with us. In such a city thousands of children are born every year; thousands of these children die every year. You have with you every year thousands of children under five years of age dependent for their very lives upon milk, that most perishable of foods. This food comes to your city, as it comes to other cities, from thousands of farms within a radius of hundreds of miles, and is handled by hundreds of men. Are you willing to do what you can to protect the babies of your city? These babies are the future citizens of your state. Will you help to stop all the suffering that annually comes to these thousands of children? Will you help to prevent the despair of the father, the anguish of the mother? Your state and city governments are doing much to help in this work, but state and municipal officers need the help of every citizen. Portable laboratories and milk stations are needed by all of the people, the rich as well as the poor, especially in summer. Certified-milk plants are needed, and here is work for the physician. There is a great opportunity for the philanthropist to join hands with the citizen and the physician in this work. The philanthropist may, without danger of doing harm with his money, establish for a limited time, until their value has been proven, a number of field milk inspectors. These inspectors, most of whom should be women, preferably, trained nurses, should inspect and report to a board having charge of the work the condition of the farms and dairies supplying milk to the city, the board or committee, in turn, forwarding these reports to the health authorities. These inspectors should be paid for by private philanthropy, but should receive such appointment from the state as would enable them to gain access to the premises they desire to investigate. The duties of these inspectors should be both educational and advisory for the milk farms, the dairyman, and the consumer. Such inspection would direct the attention of both the consumer and the producer to the drainage, ventilation and other sanitary needs of the farm and dairy, and they would serve to awaken the public to the necessity for clean milk for babies.

The Production of Clean Milk from a Practical Standpoint

Samuel C. Prescott
Boston Bio-Chemical Laboratory, Boston, Mass.

The water for a city is, in general, derived from a single large source, or few sources, in areas which may be so safeguarded as to prevent pollution with pathogenic or intestinal bacteria, and its transportation to the consumer is not attended by serious danger of infection. Milk, on the other hand, is obtained from a large number of small sources—the individual farms; it is constantly subject to contamination because of the methods of handling from the time it is drawn from the cow until it reaches the consumer.

As milk is almost universally used as an article of food, especially for infants and young children, as well for others of weakened or impaired vital resistance, it is of the utmost importance that it should be wholesome, sweet, and clean. No one questions the nutritive value of good milk, but it is becoming more and more widely believed that much of the sickness and many of the deaths of young children are due to impure and dirty milk, that is, milk which contains harmful bacteria and other substances naturally foreign to milk as it is secreted by the healthy cow. It should always be recognized that milk is a substance of great food value for microbic life, and especially for those organisms which can cause lactic fermentation and putrefactive changes. As these bacteria readily find their way into milk unless great care is taken to prevent them, the possibility of an enormous increase in numbers and a corresponding increase in the amount of decomposition products is a matter of great importance. Thus, paradoxically, the fact that milk is a rich food becomes a source of weakness when we consider it from the standpoint of industrial or economic bacteriology.

Normal Milk the Aim.

The real milk problem which we have to consider is, I believe, not chiefly how a sufficient quantity of milk with a definite percentage of fats and solids may be obtained, but how the inhabitants of the cities shall be provided with milk which is sweet, clean, free from questionable substances, such as preservatives, and low in bacteria. In other words, how may we supply normal milk?

Two lines naturally present themselves—first, the passing of laws or ordinances requiring much stricter observance of precautions in the production and handling of milk, or second, the treatment of milk in some way so as to destroy the bacteria. By this method the milk might be satisfactory from the standpoint of numbers of bacteria, but not necessarily clean.

In my opinion, it is by working along the first of the two lines suggested that the practical solution of the milk problem will be reached. Whether federal, state or municipal control will be best in the end cannot now be told, but I am inclined to believe that close inspection can be as well administered by the local authority as by the representative of the federal government. In any case I believe official supervision should be accompanied or preceded by a campaign of education such as is now being conducted in Baltimore.

The production of clean milk is more than a demonstrable possibility; it is thoroughly practicable but requires strict and intelligent attention to details. There are scattered through the country numerous dairies, milk from which is shown by examination to contain at most but a few hundred bacteria per cubic centimeter, and to be free from dirt, cow manure, and other foreign matters. I believe the value of these "sanitary" dairies has been twofold. They have provided a pure and wholesome, though high-priced, milk, and each has been a sort of missionary station from which has been preached the gospel of cleanliness in a most effective way.

Pasteurized Milk.

The second method of securing milk low in bacteria is by the process of pasteurization. This has sometimes been suggested as a solution of the

milk problem and it seems to be the easiest available present means of reducing bacteria to the number normal to pure milk. Probably about one-fifth of the milk sold in Boston has been treated in this way.

But, while the process of pasteurization may be very successfully carried out from the bacteriological point of view,[1] it should be regarded as a means to an end, and not as an end in itself. From the sanitary and hygienic standpoint it goes without question that the major portion of pasteurized milk now sold is far better than ordinary raw milk, yet the fact should not be lost sight of that a pure, clean supply of natural milk is most to be desired, as it is of greater food value than the pasteurized product and is free from the objections which may be charged against the latter.

An Experience With Market Milk.

It must be accepted I think, that by far the major portion of the milk consumed in a large city for a long time to come will be produced upon the ordinary farm, handled by ordinary men, and shipped by the ordinary means of transportation. We must not, then, be too sweeping or impatient in our demands for reforms nor make ordinances or laws which cannot be obeyed.

In my opinion the establishment of a perfectly satisfactory milk supply must be a process of evolution and education, and perhaps a slow one at that, as I have already hinted, but I believe that a great step forward is not impossible at once. It has been my good fortune to act for several months as bacteriologist and sanitary inspector for a firm selling milk in the city of Boston. The business is not a large one as compared with the leading agencies of supply, but handles the milk obtained from about 185 farms situated from 25 to 40 miles from Boston.

Before I assumed any supervision some attempt had been made by the firm to instill ideas of cleanliness and to emphasize the necessity for cooling milk. This was undoubtedly of great assistance in my work. Furthermore, the business policy of the firm had been a just one, and superior quality had been rewarded by increased selling price. This apparently liberal policy, really only honesty, was appreciated by the farmers, and they were probably the more willing to accept further suggestions.

The city of Boston has as yet no milk commission for certification, etc., but the Board of Health has enacted an ordinance forbidding the sale by the dealers of milk containing in excess of 500,000 bacteria per cubic centimeter or at a temperature above 50° F. under penalty of fine. A fairly rigid inspection is enforced, and offenders are warned, or if this is ineffective, fined. It is obviously to the detriment of a milk dealer to be thus haled into court, and most of them, therefore, prefer to engage some bacteriologist or inspector to keep a watch on the milk rather than take the chance of a fine. In my own case I believe I was engaged not merely to get the supply into condition just to clear the law, but to see if a really excellent milk could not be obtained.

I was given free rein to conduct my campaign as seemed best to me. I decided on a system of inspection for bacteria and leucocytes, as conducted also by the city Board of Health, and also upon a personal inspection of the premises and farms as perhaps the best means of approaching the farmers and getting into touch with them. Having been country-bred, and therefore knowing the characteristics of the New England farmer, I undertook to visit personally every farm sending milk, to talk with the farmer and ex-

[1] It is the writer's belief that all pasteurized milk which is sold should be distinctly designated. The ease with which the number of bacteria may be brought within the legal limit renders it possible for unscrupulous dealers to utilize filthy, half-decomposed milk high in bacteria, and by this simple process destroy the bacteria so that the milk may be sold as clean milk, conforming with the legal requirements. To what extent harmful products (toxins) have been developed in the milk previous to its pasteurization and left unchanged by this process is unknown, but it might be that such poisonous bodies could be present in considerable amount. It seems to the writer that not only should pasteurized milk be so labelled, but that there should be a law limiting the age, acidity, and number of bacteria in milk which is to be pasteurized and subsequently exposed for sale. It must be admitted that such a law would be easily evaded unless rigidly enforced.

plain the reasons for our inspections, and to suggest whatever means of improvement in his methods and appliances seemed to me to be sensible and practicable.

This program was carried out, all the farms being visited during the hot weather, when the trouble with cooling, etc., would be at its maximum. While these farms are scattered over an extended area, the milk is brought every morning, and, in the case of the nearer farms, every evening also, to two receiving stations where it is mixed and bottled and put on ice ready for shipment.

The farmers themselves may bring the milk, each from his own farm, but in the case of the more distant dairies the milk is generally transported by some one of the producers, who carries all the milk from his neighborhood. Thus a number of milk routes are established, and by knowing what time any carrier is due to arrive at the receiving station it is possible to get samples from any farm whenever desired. The farms are all numbered, and each can of milk has attached to it a label bearing its proper number. As the wagons arrive at the receiving station the samples for bacteriological examination are taken by a trained assistant, who sees that the milk in the can is properly mixed before the sample is taken. Each farm is examined in this way as least once a month, sometimes twice, or three or four times if it is necessary. As no regular order of collection is maintained, there is no chance for a farmer to be especially careful on the day his milk is sampled, for his may be selected for examination any day or on successive days. After the samples are collected they are at once taken to the laboratory and plated, and examined microscopically for leucocytes and streptococci. The examination has a double effect—we are able to determine which farms are sending in milk which by itself would be unsalable owing to the ordinance limiting numbers to 500,000, and which are entirely satisfactory, regardless of the ordinance. Personally, I believe the Boston system a wise one, and that it is well to have a wide margin at first, because it is a condition which the farmer can reach. This limit can probably be lowered at a later time with good effect.

If as a result of our inspection we find that a farm is exceeding the limits allowed by the ordinance, a card is sent directly from my laboratory to the farmer, i. e., not through the office of the company at all, telling him that on a certain date his milk contained a given number of bacteria, and suggesting that greater care and cleanliness will probably remove the difficulty. If his record has been a good one hitherto, a statement is written in to that effect, together with the statement that the lapse is probably accidental. If, on the other hand, the record of the farm has not been satisfactory, the full force of the warning is expressed, viz.: that unless improvement takes place at once the company will be forced to exclude his milk.

It is interesting to note that after a warning card is received, milk from that particular farm is generally of excellent quality. Although the ordinance does not prescribe a fine for sale of milk containing high leucocytes such milk is generally excluded by the Board of Health. Examination for pus, as the leucocytes are generally called, leads not to a warning, but to an inspection of the farm and the examination of each cow individually.

In case, then, the milk from a certain farm is high in leucocytes, instead of excluding all milk, an examination is made, and milk from all cows not affected is allowed to be sent as usual. Affected cows are held in quarantine, so to speak, until a further examination shows the milk to be normal again. If this does not occur in the course of a few days, a veterinarian is called in. We consider that there is danger when we find both leucocytes and streptococci together (leucocytes + streptococci = danger), while the evidence is far less conclusive in case of leucocytes alone, especially as these are likely to occur with a very small number of bacteria.

The results of our examinations as

seen from the accompanying table are to me interesting and striking. These show that in less than nine months the largest percentage of samples grouped arbitrarily by numbers has changed from the one above the legal limit to the lowest of all. Of course, this was due to some extent to the cold weather.

BACTERIOLOGICAL INSPECTION OF MILK

Percentages of Total Samples Examined, Graded According to Number of Bacteria per Cubic Centimeter, June, 1905, March, 1906.

Bact. per c. c.	June.	Mar.
10,000 or below	2	33.8
10,000 to 50,000	17.4	39.9
50,000 to 100,000	12.5	7.5
100,000 to 250,000	25.7	8.6
250,000 to 500,000	11.8	1.9
500,000 or above	30.5	8.3

Total samples examined 2148.

Another thing that we have done is to prepare a simple statement, with some suggestions as to care and handling, and the description of some experiments which have been carried out, to show how many very simple things may add greatly to the bacterial contamination of milk; for example, such things as the introduction of hairs, bits of hay and particles of dirt and manure, the effect of washing and not washing utensils, and the effect of time and temperature on the development of bacteria.

Some Practical Conclusions.

From the observations that I have been able to make as a result of this and earlier practical work on this subject I am led to believe that the farmer's side of the case has not always been fairly considered. That clean milk may be produced with moderate-priced or even ordinary barns I am convinced as a result of my inspection work. One should not expect, however, to get as fine results under these conditions as with more expensive equipment. At the present time, with fierce competition and the low price of milk, the farmer is perhaps doing all he can afford. I confidently believe that if the farmers were to receive five or six cents per quart, and were told how to produce clean milk, many of them would do it. This would mean, of course, that milk should cost the consumer ten cents, which is a reasonable figure as compared with the cost of other foods. As a matter of fact, the cost of feeding the cows has actually doubled in a few years, yet the farmer is expected to take the same price for his milk. Until some readjustment of costs takes place I think that we can rightfully expect but little more in the way of care from the farmer. The careful farmer who knows the cost of his milk and charges for it accordingly is likely to find that his good milk is soon crowded out of the market and replaced by that of a poorer quality. The remedy lies largely with the consumers. It seems to me that a satisfactory clean-milk supply is possible and practicable if the following suggestions can be put in force:

1. An intelligent, sympathetic, but rigid inspection or supervision of the farms, excluding milk from all those sources where the farmer is not inclined to do what he can to fulfill cleanly conditions.

2. Dissemination of information to the farmer of needful points as to the care and handling of the milk at the farm, and, in fact, to all those who have to do with the handling of the milk before it reaches the consumer.

3. Proper regulations and inspection of the handling, transportation, etc., with perhaps an ordinance, as in force in Boston, setting up a bacteriological standard for salable milk.

4. A higher selling price to the farmers in return for the extra care in the production of clean milk.

Of course, the importance of cleanliness must be impressed on all from the producer to the consumer, as, after all, the whole question comes down practically to a question of cleanliness in handling. If proper care is taken at the barn and clean cows, clean men and clean utensils are insisted upon, clean milk will result. From this point on the milk must be kept cold as well as free from contamination. But these precautions though simple are absolutely necessary for the production of high grade milk.

The Claims of the Baby in the Discussion of the Milk Question[1]

J. H. M. Knox, M.D.

Physician in charge the Thomas Wilson Sanitarium for Children, Baltimore

For the tiny heirs of comfort and luxury special scales are constructed that the proper bi-weekly gain in avoirdupois may be accurately ascertained; special fabrics of wondrous softness are on the market, that there may be warmth in the clothing but no chafing of the baby's delicate epidermis; skilled attendants keep the little tyrant under a constantly watchful eye, quick to discern and report the slightest deviation from normal, and, most important, for the number of these babies who must be bottle fed, a milk of the first quality is procured, which has been produced by carefully selected cows, under conditions bordering upon surgical asepsis, and modified in sterile vessels with boiled water under the direction of an experienced physician.

Unfortunately, however, from the standpoint of the city's statistics, the children above described form a very small group of the total infant population. The babies who have ideal or even satisfactory surroundings are far outnumbered by those brought up in homes unsanitary for adults and still more destructive to the infant's less resistent organism. In the close, moist atmosphere, in the only heated room which is at once a kitchen, a store room, a laundry and a dining room, the baby often has its whole being; the only outside air it is permitted to breathe comes in the form of a draft from a defective window or an opened door.

It goes without saying that the mother in a household of this kind can take but inadequate care of the youngest member of her family. Besides being the family cook, laundress and housemaid, she may in addition bring in outside washes or sewing, or go out herself several hours each day for other service. It is, of course, from centers such as these, which are common, especially among our foreign and negro population, that the community is continually threatened with the spread of various communicable diseases, it is in similar homes that the largest death rate among infants and children occurs. The work of reaching the baby in these homes with a suitable milk implies, as is evident, much more than the improvement of the supply at the farm and dairy.

Let us now consider briefly but fairly the actual state of affairs in Baltimore in respect to the baby. What are the chances for its life in this civilized community. The total number of deaths per annum in this city is somewhat over 10,000, or about nineteen in every 1,000 of the population. Of the 10,000 more than 3,000, or one-third occur in children under five years of age: more than 2,000, or one-fifth of the total number occur in infants under one year of age. An analysis of these deaths reveals the fact that fully 1,000 deaths or *one-third of the total child mortality* is due primarily to faulty nutrition, and with a much larger number the lack of food has an indirect bearing. Other factors, of course, are also operative, increasing the difficulty of reaching a final solution. Surely this would be a lethargic community if it could complacently hear that there took place each year within its borders 1,000 cases of direct and fatal poisoning and yet the case of the infant against the public shorn of all blandishments can be truthfully stated almost thus bodily.[2]

This slaughter of the innocents can be attributed to three chief factors:

1. Inherited constitutional weakness;
2. Unhygienic surroundings, including lack of care;
3. Improper nourishment.

[1] The full text of this paper is published in the *Alumnae Magazine* of John Hopkins' nurses.

[2] In the number of cases now being considered deaths from the various infectious diseases, from tuberculosis and pneumonia are not included, we are confining our attention to two groups of maladies common in infancy and frequently occurring together, namely, disorders of the alimentary tract, and malnutrition or the wasting diseases. From these two general causes occur in our fair city 1000 deaths among children each year.

Unquestionably many children suffer for the sins of their parents and begin the struggle for existence heavily handicapped with inherited disease or with lowered powers of resistance. The children of confirmed alcoholics are notoriously feeble. The offspring of underfed mothers are smaller than the average. Again, such unhealthful surroundings as have been referred to in the crowded one or two-roomed home certainly exert a deleterious influence upon the life of a baby.

While the two factors first mentioned are potent in producing this unnecessarily large number of deaths among children, undoubtedly there is more destruction of life among infants directly traceable to improper nourishment than to any other one cause.

It has been known for many years, for example, that but a small percentage, 3-5%, of the infants dying of intestinal diseases so prevalent during the summer months are exclusively breast-fed, or to put it differently, more than nine-tenths of all deaths from these disorders occur in artificially fed babies; that is to say, that notwithstanding the weakened constitution with which many of these children are born into the world, notwithstanding the squalid environment amid which they must live their lives, that when their nourishment is suited to their needs, they are, for the most part, able to resist these yearly devastating epidemics. A similar condition of affairs is true of that other large group of maladies contributory to the unnecessarily high death rate, namely, mal-nutrition, or the wasting diseases, in which the child, without apparent cause, gradually loses weight and strength and finally succumbs it may be to some inter-current affliction.

Such cases are of the utmost rarity among breast-fed infants, even in the poorest homes. We return, then, with renewed interest to a consideration of the problem of securing for these defenseless citizens a proper nourishment such as will insure them life and liberty and the future pursuit of happiness.

At the outset it must be emphasized with all the stress possible that it is futile to hope that we shall ever be able to obtain for infants a form of nourishment at all equal to mother's milk, and it is the duty of every physician and nurse, of every philanthropist having to do with this problem of saving infant lives, to recognize this fact and to insist upon this natural and easiest method of rearing the baby whenever it is possible; and to bear in mind also the fact that where the mother cannot supply sufficient milk for the sole sustenance of the baby she should be advised to furnish what she can, and warned that she cannot forego nursing altogether without endangering the life of the child. Notwithstanding the fundamental importance of breast nursing, this function which distinguishes mammals from other members of the animal kingdom, seems to be becoming increasingly difficult for women. The wear and tear of modern life, with its demands upon the mother's nervous strength and upon her time, and other factors less definitely recognized, have made it impossible for the human race to offer to its progeny the sustenance intended by nature and which is granted as a natural right to the pig in the sty, to the pup in the kennel,—the right of the young to obtain its nutriment from its mother until it be able to digest the ordinary food.

It must be remembered that the mammalian young are not fully developed at birth as are the birds or reptiles, but that in each species the mother's milk is exactly adapted to bring about this development, and that the milk of any other animal is at best a foreign material. It is almost as reasonable *a priori*, to expect an unhatched chick to thrive on corn as a new born baby to flourish on the milk of another animal.

With these facts in mind we can deplore with reason the fact that so many of the human race must be bottle fed, and can understand the importance of securing, when necessary, for the immature and delicate infant the best possible substitute for its natural nutriment. Space will not permit even a reference to the numerous artificial foods on the market that are extolled as substitutes for mother's milk. They all of them are

deficient in essential ingredients and at best can be used safely, only for comparatively short periods.[1]

The Situation. We are obliged, then, to confront not a theory but the following conditions:

1. A very large number of the children of our large cities, including Baltimore, must be bottle fed.

2. Cow's milk offers the only practical substitute for mother's milk for these infants.

3. A very large number of infants become sick and die each year in Baltimore from diseases directly attributable to bad nourishment.

The arraignment of impure and dishonest milk is even more justly severe than has been heretofore indicated, for not only is a large share of the infant death rate attributable to it, but also because a considerable number of children dying from other causes, for example, infectious diseases, bronchitis and from pneumonia, might have recovered if properly fed before and during their illness.

What, then, is the character of the milk accessible in Baltimore to the average mother having to bring up her baby on the bottle?

In a comprehensive investigation by the Thomas Wilson Sanitarium the attempt was made to follow the milk from the cow to the baby by collecting samples from various dairy farms, from the cans as they were unloaded at the railroad stations, from the delivery wagons from the large and small dairies and again from the stores. The result can be summarized briefly.

In all 293 samples were examined. The milk was found to average 76,000 bacteria to 1 c. c. on the better farms, 350,000 on the ordinary farms, 1,750,000 at the railroad stations, about 4,000,000 in the delivery wagons and 5,000,000 at the small stores and dairies, while in the larger dairies there were 1,340,000 bacteria in the same quantity. Moreover, preservatives, usually formaldehyde, were found to be present in 15% of all samples at the stations, and in nearly 50% of the samples taken from wagons and small stores.

This study shows the rapid deterioration of milk in its passage from the cow to the baby when it is not accompanied at every step with honest, scrupulous care and efficient refrigeration.

It was the opinion of those conducting the investigation that a number of not too strenuous regulations rigidly enforced would greatly improve the milk without adding materially to the cost of production.

The Milk Dispensary. In June, 1904, through the generosity of a public spirited citizen, the Thomas Wilson Sanitarium was enabled to establish five stations in Baltimore for the distribution of modified milk for infants.

From the outset it was designed to place the dispensaries at the disposal of the physicians of the city, asking them to recommend for the milk such babies for whom good milk could not otherwise be procured. A uniform charge of ten cents daily, somewhat less than cost, is made for each mixture, sufficient for twenty-four hours, put up in feeding bottles ready for immediate use. The number of bacteria in this milk rarely reaches 10,000 per c. c.

During the first year 128,765 bottles were distributed among 553 babies, while in seven months of the second year 126,525 bottles have been furnished to 321 infants. The stations are, for the most part, in the same buildings with the Charity Organization Society agents and the instructive visiting nurses, and are presided over by experienced trained nurses who keep records of each baby, weigh it at short intervals, make reports to the physician who referred the case, and visit it frequently in the home.

Of more than 800 patients supplied by the Thomas Wilson Sanitarium Dis-

[1] The one most generally in vogue in Baltimore is a form of condensed milk. The results of this preparation are seductive. Often the infants taking it seem to thrive. They increase in weight and appear well. They are subject, however, to certain grave constitutional disorders which come on insidiously and may for all time affect the child's health. It is the consensus of medical opinion that infants fed exclusively on condensed milk or upon any proprietary food are less resistant to disease than are the children given fresh milk. Our mortality at the Thomas Wilson Sanitarium is twice as great for condensed milk babies as for infants fed on cow's milk.

[2] In an earlier investigation, the average temperature of samples obtained in summer from dealers in all parts of the city was 65.50% at which there is rapid prolification of the contained bacteria.

pensaries less than fifty have died who have been on the rolls more than one week, a mortality rate of six and two-tenths per thousand, about one-third the general figures for infants under one year, notwithstanding the fact that many extremely ill cases were referred to the stations for their nourishment.[1]

In forming a judgment of the value of milk dispensaries clinical testimony should be given more weight than statistics, and this testimony is almost universally favorable. It is gratifying to be assured as has been done by several of the physicians at the city's dispensaries that with the establishment of the milk stations they are now saving babies that would have been lost without this aid.

The effect of the dispensaries is largely educational. The frequent conferences with the nurses, both at the office and in the home, give the mothers many new view points and has a subtle influence for good which is hard to over-estimate.

It is just here that some of the most useful lessons can be taught by the instructive nurse and friendly visitor in these house to house visitations. They should be alert to notice if the milk can or pitcher is not clean; if flies have access to the milk; if the milk dipper has various other uses and if ice is an unknown luxury during the warm weather.

Imagine the consternation if 500 adult citizens were condemned to die each year through the indifference of their fellows, or were carried off by some epidemic which might have been largely checked. Yet just as surely as the summer comes will there result the usual epidemic of intestinal disorders among the children badly housed and fed which will destroy as many, and there will be no outcry whatever. A lady was complaining on one occasion to Dr. Osler that Providence had seen fit to take her little child, when the doctor interrupted with the remark, "Providence had nothing to do with it; it was dirty milk." There is a potential value about the life of a child which even this sharp commercial age has missed. If through care and skill a middle-aged mechanic is nursed back to life after a long illness, he is a middle-aged mechanic still, who after a few years of toil falls finally asleep; but in a country such as ours who can tell what the future of a child saved from infant death may become.

The infant whose right to receive its sustenance at its mother's breast is denied, has certainly the right to demand that its artificial food, at best a second rate substitute, shall be clean and honest, and at least crudely adapted to its feeble digestive powers. The strongholds of indifference and ignorance must be first captured, not by fanatical emotion, but by a fair and persistent presentation of facts. It can be shown that notwithstanding the increasing wealth and commercial importance of Baltimore the high death rate of children per thousand of her citizens has remained about the same for a dozen years, largely because there has been no corresponding improvement in the character of the milk supply or in the hygienic conditions existing in the homes of the masses.

Until these new standards are more generally recognized, particularly until the hygienic conditions amid which the working classes live have been bettered, the milk dispensaries will continue to play an increasingly useful role in the reduction of sickness and death among infants.

[1] There is merit in the use of the feeding bottle with just sufficient in each for one nursing. One cannot visit in the homes from which many of our patients come without being skeptical of the possibility of properly either keeping or modifying the milk on the premises if it is supplied in bulk.

Dairy Work Under the United States Department of Agriculture

Clarence B. Lane

Assistant Chief of the Dairy Division

Considering the fact that no crop but corn produces an income equal to that of the dairy cow, it is very important that the national government should have a Dairy Division to look after the interests of those engaged in this work. The division was organized in July, 1895; and at the present time there are forty men on the force, most of whom are trained scientists. The policy of the division now is to *show* dairymen modern methods by means of object lessons and practical work rather than to *tell* them how through bulletins and circulars.

The most recent work taken up has been the inauguration of a milk and cream exhibit at the National Dairy Show in Chicago. Exhibits were made in three classes:

Class I, certified milk—that is milk sold under a guarantee as to its percentage contained;[1]

Class II, market milk, or milk that is sold without any guarantee and without any special standard;[2]

Class III, cream.

Much interest was manifested in this contest from the start and responses came from all parts of the country—thirteen different states being represented, some samples coming from as far east as Boston, from the South as far as Maryland, and from Kansas on the West. An exhibit of milk has never been brought together at one time and place and subjected to such a thorough examination. Much less difficulty was experienced in scoring the product and awarding the medals than was anticipated. By heating the milk to a temperature of 100 degrees, any taints in the flavor could readily be detected, and the quality determined. Many thought that such a test would be impossible, owing to the difficulty of shipping cream such long distances and putting it upon a fair basis in regard to the time it was produced. The results, however, demonstrated that it is possible to score milk and cream as accurately as butter and cheese, or any other product. Some of the samples remained sweet for seven weeks.

The Dairy Division is taking up a number of lines of work, including a study of the problems in butter and cheese making.[3] Such questions as amount of salt, pasteurization, temperature, quality of cream, and time of storage are under investigation. The important subject of fishy flavors in storage butters has received careful attention. Problems of churning and working, and the important problem of hand separated cream and its treatment are also being investigated. This work is being done in co-operation with the experiment station at Ames, Iowa, and reports are being prepared and will soon be published.

Problems in cheese making have also been taken up, including making, curing, storing and paraffining cheese, and its digestibility at different stages of ripening. Several thousand pounds of cheese are now in storage at Plymouth, Wisconsin, and it is expected the results will be of much interest and value to cheese men.

One man has been constantly engaged during the past year in studying the dairy problems of the South with a view to assisting in development there. The force will soon be increased and it is

[1] The bacteria ranged from none to 51,000 and averaged 7,877.

[2] The bacteria ranged from none to 21,000,000 and, leaving out the highest, averaged 39,273.

[3] For over two years investigations have been under way in the manufacture of Camembert cheese in co-operation with the Experiment Station at Storrs, Connecticut. The work was taken up in hope that a product could be produced in this country which would rival this kind of cheese made in France and thus give the farmers and dairymen an opportunity to produce the million pounds or more of this variety of cheese which is now imported. Pure cultures are now prepared of the important molds and can readily be distributed to those desiring to produce the cheese. Such experiments will have a permanent influence upon the milk supply, giving stability to the dairy industry.

hoped to establish demonstration farms in the different sections to be used as headquarters for object lessons and disseminating information in modern dairy practices.

Another prominent feature of the work of the Division is that of preparing plans for farm buildings. Dairy inspectors who travel about the country will tell you that most of the barns are dark and damp, poorly lighted and poorly ventilated, resulting not only in the cows being unhealthy but in poor dairy products—not only milk but butter and cheese as well.

The milk supply of several cities has been carefully studied and some work has been done along the line of dairy machinery and appliances, methods of handling and pasteurizing milk.

The division will soon do some work along the line of dairy farm and stock management. The cow test association in Europe has been a great benefit to dairymen, and equal rewards are promised in this country if this idea is adopted.

These are times of great progress in many of our industries and the dairy industry is keeping pace with others. The dairy farmer in many of our country towns now has the trolley, the rural delivery and telephone which keeps him in touch with his markets.[1] The progressive dairyman knows what it costs him to produce a hundred pounds of milk or a pound of butter, what it costs to keep each cow in his herd a year, what it costs to raise crops,—in fact, he is a first-class business man.

[1] One of the most recent machines to which his attention is being called is the cow milker. After many years of waiting and many disappointments improvements have been perfected in these machines which make them simple in construction and so far as the investigations of the Dairy Division have gone thoroughly harmless and rapid in their work.

Tuberculosis of Cattle

How it may be repressed and its relation to public health[1]

Leonard Pearson

Philadelphia

Now that we know that tubercle bacilli of bovine type are virulent for man, we know that milk carrying them is freighted with danger. So much established, the next important question is as to the frequency of the occurrence of tubercle bacilli in milk. It will probably be sufficient to say that tubercle bacilli are most plentiful in milk and milk is most dangerous when the cow suffers with tuberculosis of the udder. Even though the milk of a cow with tuberculosis of the udder be diluted with the milk from a number of large herds, the mixture still continues to be infectious. But tubercle bacilli may also occur in the milk when the udder is healthy. The danger in such cases is in proportion to the extent of disease in the cow. One of the striking points regarding tuberculosis of cattle is that the disease may be very extensively developed without producing external signs. This peculiarity was very strikingly shown in the case of a fat steer that was awarded a prize at the great livestock show in Chicago.

Where there are in a stable cows with extensive tuberculosis of the lungs, tubercle bacilli are scattered widely and may be deposited on the hair of the cows. Moreover, as cows do not expectorate but swallow their sputum excepting when it is coughed out, tubercle bacilli may be passed in great numbers with the dung. Therefore, as the milk is soiled by the dust and dirt from the flanks and udder of the cows, from the

[1] The first part of this address was given over to a discussion of investigations bearing upon Koch's famous declaration before the British medical congress in 1901 that bovine tuberculosis is of such slight importance to the public health that no action need be taken in regard to it. "The recent great additions to our knowledge of the bacteriology of tuberculosis," said Mr. Pearson, "have made it possible to distinguish the bovine from the human type of tubercle bacillus; and studies in nearly all civilized countries show that the bovine bacillus is the cause of a varying amount of disease in the human being. These studies are not yet sufficient to justify one in drawing any conclusions as to the actual frequency of the infections. But that the same kind of tubercle bacillus that produces diseases in cattle may produce disease in man, there appears to be no room for difference of opinion.

hands of the milker and from the stable air, it may become contaminated by tubercle bacilli from these sources.

But most of this danger can be avoided, as I have said, by sufficiently frequent and careful physical examinations of milch cows. Unfortunately, however, even this precaution is rarely taken by states or municipalities. Among the exceptions is Massachusetts, which has the most complete system of herd inspection of any state. In Pennsylvania it is required under a new law that cattle with tuberculosis of the udder or with advanced or generalized tuberculosis shall be reported to the State Livestock Sanitary Board, whereupon they are destroyed.

The introduction of a general system of dairy inspection would perhaps have made more rapid progress if it had not been for the introduction of the tuberculin test.[1] This method has shown such an appalling amount of infection among the dairy cows of some regions that the extermination of such animals cannot be seriously considered. It would be highly unjust to the owners of such animals, and for the state to pay for them would require an enormous and impossible appropriation. More than this, it is unnecessary. But the cost of exterminating animals afflicted with open or clinical tuberculosis, tuberculosis that may be detected by physical examination, falls within such limits as to make the plan feasible. In Massachusetts, for example, the amount of indemnity for such cows amounts to about $30,000 a year.

It is unfortunate that so many people are unwilling to support a proposed movement because it is not ideally complete and perfect. Because such an inspection as I have outlined will not lead to the complete eradication of tuberculosis among cows and will not insure the production and sale of milk wholly free from tubercle bacilli, some people are unwilling to accept the 90% gain that will come from the application of this system.

[1] By this means the very early cases of infection can be discovered, even before the disease has reached a stage that renders the afflicted animal dangerous to other cattle or to the consumer of its products. Formerly only such animals were classed as tuberculous as showed physical signs.

But if an ideal condition cannot be obtained with relation to the general milk supply of a large city, it may be obtained on a small scale. In nearly every large city there is some special milk supply that is wholly above reproach. Being sold under the certificate of a commission, milk of this character is commonly known as "certified milk." To the credit of Baltimore it should be said that certified milk on sale in your city, was recently awarded the highest prize at the National Dairy Show, held in Chicago.

In searching for a reason for the tardy development of the application of sanitary methods on dairy farms we find that it is chiefly due to lack of knowledge and indifference on the part of the consumer. Until consumers, and physicians, know what clean milk is, and demand clean milk, and demand information as to the conditions under which milk is produced, the production of safe and clean milk will not be encouraged.

It was found through investigation made three years ago by the Keystone Veterinary Association in Philadelphia that nearly all the hospitals and public institutions in that city were buying milk as they would buy coal, from the lowest bidder, and without any standards for inspection, or requirements as to the cleanliness and the sanitary conditions of the milk, the farms or the cows. Further investigation showed that much of this milk came from such sources that it could not be safe or clean. The situation is now much better. Most of the hospitals require information and a guarantee as to the kind of milk that is supplied to them.

There must be some means of controlling the accuracy of reports of milk dealers as to the conditions governing their supplies. This means should be furnished by the Department of Health of the city or by the Livestock Sanitary Board of the state.

Heretofore, nearly all of the work that has been done in this direction, has been done to repress tuberculosis of cattle for the purpose of controlling it *as a disease of cattle* just as contagious pleuro pneumonia and Texas fever are con-

trolled as diseases of cattle and not on account of any relation of these diseases to public health. As a disease of cattle alone, tuberculosis is of sufficient importance to justify expenditures very much greater than have yet been made for its control in any state.

The method for controlling tuberculosis of cattle that has proved most effective is that based on the detection of tuberculous animals by the use of the tuberculin test, and their isolation. Denmark has done more in this direction than any other country. During the past four years, considerable work has been done by the Livestock Sanitary Board of Pennsylvania for the purpose of developing a practicable system for the immunization of cattle from tuberculosis by vaccination. We have worked out a method which we know is effective but which cannot be applied to all dairy cattle on account of the tremendous expense. It will be first applied where the need is greatest, and for a long time it will continue to be advisable to follow the plan for the frequent physical inspection of dairy herds that I have outlined. In the meantime, bovine tubercle bacilli need not be fed to infants, for certified milk is available an dother milk may be rendered safe in respect to this factor by adequate pasteurization.

The Present Needs of the Milk Supply of Baltimore

C. Hampson Jones, M.D.

Assistant Commissioner of Health, Baltimore

My purpose is not to convince you of the vileness of milk, for it is not vile, but to elucidate some features of the marketing of milk which, if improved, will lessen or entirely remove unseen dangers that lurk in it.

The establishment of the chemical and bacteriological laboratories of the health department in 1896 and the appointment of food inspectors, who were empowered to arrest offenders and to destroy food below legal requirements, inaugurated a change in our milk supply which has resulted in a permanent improvement, as must be apparent to everyone who can remember the conditions in 1895. It is true that our inspectors have spilt 557 gallons of milk during the last three months because it was below a specific gravity of 1029, and that in a short time we will spill milk because it has been preserved with formaldehyde, yet it also remains true that less of these spillings are required than in former years.

Our milk is received from three sources—first, from cows in stables within the city limits; second, from dairies just beyond the city's boundaries and brought in by wagons, and third, from the farm districts that depend upon the railroads for transportation.

The city producers supply 1200 to 1500 gallons of milk by distribution direct to consumers or small stores. The abolition of a number of such stables within our city limits,[1] was not an unmixed blessing, because a few of them were simply transferred to the outlying district, where they have developed into a greater menace to health than when they were within the jurisdiction of the health department. Their closeness to the city—a mile or two beyond the limits—permits the milk to be brought twice daily into the city without necessitating that care to keep the milk cool and clean which a producer at a greater distance knows is necessary in order to prevent the milk from souring.

Confined in one place were 68 cows. When the stable door was closed there was not enough light to make all of the cows clearly visible. There was no ventilation except that which the stable-owners could not prevent. Vapors and foul odors arose from the

[1] In 1902 an ordinance caused the number of cow stables within the city limits to be reduced from 398 to the present number—274—a reduction of 124. Of these 274, all but eighty-six are private stables. This ordinance will still further reduce the number of such stables as the city is built up, because the owners will not be able to obtain the required one-quarter acre of land contiguous to the stable.

hot, wet bodies and discharged wastes from the animals. A peculiar, penetrating acid odor was added by swill and other foodstuffs; the footway, part of the stalls and the bodies of cows were wet with urine, and the cows' hindquarters caked with dried manure (an accumulation of days and weeks). The poor beasts are kept chained up in such a place for months without fresh air, sunlight or exercise. The width of the stalls is barely enough to let the cows lie down, and the stalls are too short to keep the tails of the cows from lying in filth in the trenches that are intended to act as drains. In perfect keeping with such conditins we find the "milkmaids." Their clothing is filthy, and if they ever washed their faces and hands it must have been done unintentionally. Filthiness was especially evidenced by the condition of their hands, which were shaded by layers of manure that differed one from the other in age only.

The framework of the stable was festooned with cobwebs; whitewash was apparently unknown, and filth covered the sides and rafters. The "milkmaids" sleep in a loft above, which is heated by the body-heat of the cows. The 40-quart cans were in bad condition, and were kept in a small, dirty, dark shed just outside the stable. They were uncovered and filled with milk. This stable was the worst of all. There were others that presented conditions almost as vile. On March 19, 1906, the bacteriological laboratory reported an examination made of the milk produced at this place. One cubic centimeter of the specimen taken from the milk bucket showed 7,920,000 bacteria. These stables are not kept by Americans nor by such foreign-born people as the Germans.

In contrast—in the same neighborhood, surrounded by the same political and social conditions, with the same price for milk—is a stable kept by a German. This place is so well lighted that we did not use the flashlight to obtain a photograph; it was clean, whitewashed, and well ventilated; the floor was of cement and well drained; the man was clean, his helpers (who were his children) were clean, and they apparently took great pride in their cows and stable. The stable was not perfect, but it was a splendid example for others to follow, and proved beyond all question that the pleadings of others that poverty and the price of milk prevent them from adopting our suggestions for improvement are nonsensical. A specimen of milk from the milk bucket showed less than 10,000 bacteria per cubic centimeter. This man was not alone in the cleanliness of his cows and stable, and it appeals to me that such men, who of their own accord have endeavored to give our citizens milk that is not offensive to decency and health, should be helped in their work by giving them the approval of the health department.

The milk from these nearby sources amounts to 2,000 gallons daily. It is distributed directly to consumers by wagons, or indirectly through stores, or still more indirectly through wholesalers, who supply retailers who own wagons or stores.

There are about 326 shippers of milk by railroad, and it is estimated that they send to Baltimore 24,525 gallons of milk daily. In these country districts—the real country—we find a condition of affairs far from perfect, but nevertheless good and encouraging. It is to these that the city must finally look for its entire milk supply, because, as the city grows, our city and suburban dairies will vanish. My visits to these farms showed me cows in fine physical condition; they were clean and of good breeding for the production of milk and cream. The stables for the most part were clean and whitewashed, and usually well drained. We found milk buckets and milk cans clean and out in direct sunlight. The dairies varied a great deal in their distance from the cow barns. Some were next to and directly communicating with the stables; others were quite a distance off, located over a spring. The interior of these dairies was clean and utensils in good condition. The bedding for the cows was of straw or hay; feed troughs and chutes were frequently found in the stables, all of which increase the number of bacteria in the atmosphere. Very frequently the water wells were too close to barnyards and other filth collectors, the seepage from which must reach the water wells sooner or later. The barnyards in many instances were passageways for cows from the fields to barn and return, thereby collecting filth that is with difficulty removed before milking, which makes it likely that it is frequently not removed at all.

These farms are usually within a radius of four miles from the railroad stations, and most of them not more than two and one-half miles and the stations themselves are probably all within fifty-five miles of Baltimore. The milk from the most distant station is not more than two hours and

a half traveling to the city. The city has two inspectors of milk, who are required to meet milk trains. After they are through with the station work they turn their attention to the milk delivery wagons and the stores, carrying out the same regulations as at the stations.

During the last few weeks these inspectors, the inspector of city dairies and the inspector of markets, have assisted in obtaining milk specimens for bacteria counts, dust cultures from stables, and samples of milk to show the gross dirt. In the counts made from specimens from the milk bucket and milk cans in the producers' stables (city and suburban only), the cleanest stables gave the lowest count—10,000 —while the dirtiest gave 7,920,000 in one cubic centimeter of milk. The counts of specimens from the railroad stations clearly show that something more than time, distance, and methods of transportation cause the great difference in the number of bacteria, because these three items are practically the same for all shippers from the same station. In three specimens coming from the same station the count ranges from 70,000 to 2,524,000.

Enough has been shown to convince you that there is need of more and greater work by your health department. This greater work is to be accomplished:—

First need: Relations of trust and confidence between the producer, dealer and health department, thereby producing a hearty co-operation. To do this it is of first importance for the producer to understand that it is of no advantage to a health department to impose unnecessary and burdensome regulations on the producer. What we desire is quick delivery of pure milk into the city, and this simply means to deliver the milk as nearly as possible in the same condition as it is taken from the udder. Therefore, it is necessary to cool the milk below 50° F. as soon as possible, thus retarding the multiplication of the few germs naturally in the milk, to keep it at a low temperature until delivered at the station, and to avoid adding anything to the milk accidentally or intentionally.

I am sure that the evil conditions of farm dairies are due to the fact that the dairy business is a sort of addition to the general farm work. If one producer can now send milk to this city with but 10,000 organisms per cubic centimeter and his neighbor sends milk with 5,000,000 per cubic centimeter, there is something wrong in the management, and not the cost of production. It will be the function and desire of health officials not only to guard the purity of the milk, but also to assist the farmer in their efforts honestly made to meet requirements.

Second need: Better care of milk en route to the city and quicker transportation, improvements in the roadbeds and special milk trains. All the trains during a greater part or all the year should have sectional refrigerator cars. The railroad milk platform should be covered, and it may be necessary to have it artificially cooled, so that the cooled milk brought from the farm may be kept at 50° F.

Third need: For all milk dealers to establish modern, up-to-date dairies, where the milk can be properly cleansed, perhaps pasteurized and cooled, in rooms free from dust and flies, and to allow nothing that has not been sterilized to come in contact with the milk. All dealers should deliver milk in bottles, except to hotels and institutions. Sterilizing plants should be established not only for milk bottles, but also for thoroughly cleansing and sterilizing milk cans before they are returned to the producers.

Fourth need: That the consumer shall become acquainted with the qualities of good milk, and demand it. The real control of the milk trade is largely in the hands of the public. More, what the public demands of the producer and dealer or purveyor should be practiced by the public. Milk containers should be for milk alone. Whether it is a bottle or pitcher, it should be cleaned and sterilized when emptied. When it contains milk it should not be allowed to remain uncovered; it should be kept cool; it should never be permitted to remain in a sickroom, and should be immediately sterilized and removed from the room. In your households there is as much, and probably more, chance for milk to be contaminated with infectious diseases as in the producer's barn. A tuberculous servant is much more dangerous than one tuberculous cow in a herd.

Fifth need: That the Health Department of Baltimore city be immediately informed of the occurrence of sickness on a dairy farm, so that the proper officials could act in time to protect the milk from contamination, and sufficient power be given them to employ whatever measures may be deemed necessary in any case.

Sixth need: There should be co-operation of the Maryland Live-Stock Sanitary Board, State Board of Health, and our City Health Department in the supervision of the health of the dairy cattle.

In these diseases the power should be given to segregate all sick cows, whether the disease be tuberculosis or a disease pro-

ducing pus in milk,[1] in order to keep the milk from market and to destroy such cattle if necessary. I believe that it should not be left to the owners of dairy herds to decide whether tuberculin tests should be made or not, but that it should be done by state or city authority, or both. I cannot here enter into a discussion concerning the costs of such work, but I beg leave to say that the city and state will stop at no expense to prevent or stamp out smallpox, yellow fever, cholera, etc., and provide for it out of the general tax levy. I can see no real difference between those diseases and the summer complaint of children, except the latter, like the poor, are always with us. In 1905 803 children died of this trouble in Baltimore.

[1] Swithinbank and Newman give the credit to Dr. Stokes of Baltimore for the first work demonstrating pus in milk and showing it to be one of the probable causes of the summer complaint of children, and yet we are almost the last to move to put our knowledge into use.

Seventh need: That the Health Department be permitted to establish a distinct subdivision, to be known as the "milk division," which shall be in charge of a thorough and practical milkman, who knows the sources of contamination, and whose duty it shall be to point out to the producer or dealer a way to avoid them. The force of inspectors should be increased, so that a more thorough daily inspection can be made; that it also be permitted to establish a system of licensing all producers and dealers, the issuance of such licenses to be governed by the obedience to the department's regulations by the applicants, but that no fee shall be charged for the license.

Eighth need: To have our friends, the members of the honorable board of estimates, to see these things from our viewpoint.

Morbific and Infectious Milk[1]

George M. Kober, M.D.
Professor of Hygiene, Medical Department, Georgetown University
Washington, D. C.

Few countries until recently have deemed it necessary to do more than prevent adulteration of the milk. Some legislators appear to think that as long as the milk has not been skimmed or watered, and contains the standard of total solids and fats, we need not worry about the germs we eat or drink. This may be a pleasing reflection to persons who do not know that such hydra-headed diseases as scarlet fever, diphtheria, and cholera infantum have been disseminated in the milk supply, that typhoid-fever epidemics have been thus caused, and that milk may be the vehicle of the germs of tuberculosis and other infectious diseases and morbific agents.

The various milk faults such as abnormal color, odor, taste and consistency are usually due to the presence of chromogenic and other micro-organisms. Milk-sediments are always evidence of unclean habits. Every consumer of milk has doubtless observed the presence of more or less foreign matter at the bottom of the vessel or bottle in which it is kept; indeed, it is a matter of such common occurrence that it hardly excites attention, and many are disposed to look upon it as a matter of course. Professor Soxhelt of Munich was perhaps the first to point out that these deposits are largely made up of excrementitious matter from the cow, which, adhering to the udder of the animal, gained access to the bucket during the act of milking.

If subjected to microscopical examination, we shall find that they are composed of epithelial debris, hairs of the cow, excrementitious matter, vegetable fibers, organic and inorganic dust particles, bacteria, fungi, and spores of every description. Fully 90 per cent of the germs are intestinal bacteria, all of which is not only disgusting, but extremely suggestive of danger. The number of micro-organisms in such milk is largely increased, and we know that bacterial development and consequent decomposition are materially hastened in such a medium, and that the conversion of lactic sugar into lactic acid, apart from impairing the nutritive value, may cause gastro-intestinal disorders in delicate infants.

The greatest danger from milk of this class is the possible presence of tyrotoxicon and toxins capable of producing cholera infantum and even cases of ptomaine poisoning.

Milk may be rendered unfit for use by improper food and care of the ani-

[1] In his address Dr. Kober presented an exhaustive scientific survey of the ground so briefly covered in this abstract. The entire address is published by the *Maryland Medical Journal*.

mal, and toxic properties may be imparted while animals have been feeding on poisonous forage plants, or while the animals are being treated with strong remedial agents which are excreted in the milk. Again, milk may be morbific as the product of a diseased animal. Milk of cows suffering from puerperal and septic fevers, gastro-enteric diseases, foot and mouth disease, cow pox, anthrax, rabies and tetanus may produce sickness in the consumer. A disease resembling scarlet fever and diphtheria may be produced by the milk of cows suffering from some inflamatory and suppurative condition of the udder and teats. On the subject of the transmission of tuberculosis through the milk supply space does not admit of a review of the extended literature on the subject. Klencke, in 1846, was the first to write on the infectiousness and transmission of scrofula by cow's milk. In his book of 90 pages he gives the clinical histories of 16 children who had been fed with the milk of scrofulous and tuberculous cows, and they all point to tuberculosis of either the intestines, glands, skin, or bone. When we consider the comparatively large number of children under five years who perish from primary tuberculous ulceration of the intestinal tract, tuberculous peritonitis and tabes mesenterica and the fact that the food of these children consists largely of unboiled milk the chain of evidence seems well nigh complete but has been materially strengthened by eighty-six cases of milk bovine tuberculosis published by the speaker in 1903. Moreover Salmon has analyzed the vital statistics of Massachusetts, and finds *an increase of 36 per cent in the forms of tuberculosis other than phthisis* in the class *under five years of age*, while there was *a reduction* in the mortality of phthisis at all other ages of about 45 per cent, and the vital statistics of Michigan from 1885 to 1900 show also a tremendous increase during the milk-drinking age. All of which justifies the conclusion that tuberculosis may be transmitted to man in milk from tuberculous cows.

Finally milk may acquire infective properties after it leaves the udder of the animal. In a communication to the International Medical Congress at Paris in 1900, the writer presented his conclusions, based upon the tabulated histories collected by him of 330 outbreaks of infectious diseases spread through the milk supply. These outbreaks consist of 195 epidemics of typhoid fever, 99 epidemics of scarlet fever, and 36 epidemics of diphtheria.

It has been demonstrated by numerous bacteriologists that disease germs may not only survive, but in many instances actually proliferate in the milk, and it is not a difficult matter to point out the many ways by which these germs gain access, especially when some of the employes are also engaged in nursing the sick, or are suffering themselves from some mild infection while continuing their duties, or are convalescent from the disease. It is quite conceivable how animals wading in filth and sewage-polluted water may infect the udder with the germs of typhoid fever and through it the milk. We can also appreciate how infected water may convey the germs by washing the utensils or by deliberate adulterations. Infection may also take place by means of scrubbing brushes, dishcloths, exposure to infected air, and last, but not least, through the agency of flies.

Of the 195 epidemics of typhoid fever tabulated by me there is evidence in 148 of the disease having prevailed at the farm or dairy. In 67 instances the infection probably reached the milk by percolation of the germs into the well water with which the utensils were washed; in sixteen of these the intentional dilution with water is a matter of evidence. In three instances the bacillus coli communis and the typhoid germs were demonstrated in the suspected water. In seven instances infection is attributed to the cows wading in sewage-polluted water and pastures. In twenty-four instances the dairy employes also acted as nurses. In ten instances the patients while suffering from a mild attack or during the onset of the disease continued their work, and those who are familiar with the personal habits of the average dairy hands will have no difficulty in surmising the manner of direct

digital infections. In one instance the milk tins were washed with the same cloth which had been in use among the fever patients. In two instances the dairy employes were connected with the night-soil service, and in another instance the milk had been kept in a closet in the sickroom.

Of the ninety-nine epidemics of scarlet fever the disease prevailed, in sixty-eight instances, either at the dairy or at the milk farm. In six instances persons connected with the dairy either lodged in or had visited infected houses. In two instances the infection was conveyed by means of infected bottles or milk cans left in scarlet-fever houses. In seventeen instances the infection was conveyed by persons connected with the milk business while suffering or recovering from the disease, and in at least ten instances by persons who had acted as nurses while handling the milk. In three instances the milk had been stored in or close by the sickroom. In one instance the can had been wiped with an infected cloth.

Of the thirty-six outbreaks of diphtheria tabulated there is evidence that the disease prevailed at the dairy or farm in thirteen instances. In three instances the employes continued to handle the milk while suffering themselves from the disease. In twelve instances the disease is attributed directly to the cows having inflammatory conditions of the teats and udders. These instances, however, may be regarded as typical examples of streptococcus and staphylococcus infection, giving rise to a form of follicular tonsilitis or pseudo-diphtheria, often difficult to distinguish clinically from true diphtheria or scarlet fever.

Only a limited number of cholera epidemics were traced to infected dairies.

Sufficient data have been given to indicate the necessity of sanitary control of the milk traffic. It is highly desirable that some uniform legislation, preferably a national pure-food law, be enacted to regulate the inspection of dairy farms, etc., for, as it is now, milk consumed in New York city for example, may be produced in a number of states over which, of course, the local authorities have no jurisdiction.

All persons engaged in handling the milk should be free from disease. No family ever thinks of employing or keeping a cook afflicted with a communicable disease, and yet not the slightest restriction is placed upon nor a question asked about, the persons who handle our milk supply, which we know affords an excellent culture medium for disease germs. After the recital of numerous epidemics and milk-borne diseases we need hardly insist upon the necessity of compulsory notification of all infectious diseases, and that the milk should *not* be permitted to leave a farm, dairy, or milk shop during the existence of any of these diseases among the inmates or employes, nor should the latter be permitted to reside in or visit infected premises while engaged in the milk traffic without permission from the health department.

There is nothing strained in these requirements, as good and sufficient reasons have been adduced, and by their enforcement we may hope to obtain such a standard of milk as will not only effect a decided reduction in infantile mortality, but will render the dissemination of infectious diseases through the milk supply a matter of history only. Until this is accomplished we should patronize only such dealers as sell "certified milk," or subject the milk in pint bottles to pasteurization at a temperature of 155° F. for 30 minutes, and after cooling keep it on ice. This will not make bad milk good, but it will at least destroy its infectiousness.

In conclusion, let us be fair in this educational campaign to the milk producer. Let us emphasize the fact (and here I speak from personal experience) that ideal milk supplies cannot be attained without increased cost of production, and in the interest of public health and the many helpless babes deprived of their natural food we should be loyal to our American conception of a "square deal."

The Role of Pure Cow's Milk in Infant Feeding[1]

A. Jacobi, M.D.
New York

Nine previous lectures have made you acquainted with good cow's milk and the methods of obtaining it and keeping it fresh and germ free. Instruction on the topic of infant mortality and the dietary prevention of tuberculosis, cholera, typhoid, scarlatina, and diphtheria has been thrown in for good measure. Finally, I have been requested to speak to you on the value of your good and pure Baltimore milk in the feeding of your babies and those of your rich and poor neighbors.

Rich and poor! As the breasts of the rich and the poor mother contain the same natural food, so its substitute should be the same for the demands of the rich and the poor baby. Democratic nature knows no difference of classes.

It is true a great Boston pediatrist has blamed New Yorkers for insisting upon supplying the poor and rich alike, and thereby rendering the solution of the feeding problem more difficult. But I have ever been of the opinion that those who are to till the soil, to build our roads, to man our ships and factories, and add to the wealth and power of the country should, while infants and children, be prepared for their tasks by a competent food.

The immense literature of the subject is not so well known as it appears to many. I have been mixed up with good and bad milk these fifty or more years, and have come to the conclusion that I should wish to see the end of the discussions. After some preliminary attacks, I tackled the subject in the first volume of that epoch-making Handbuch of Carl Gerhardt.

In that year, 1876, I collected a list of a thousand books, pamphlets and essays on woman's, ass's, goat's and cow's milk—and still they came and are coming. There are tens of thousands in all languages. In extenuation of my many serious shortcomings I may claim that I have not read all of them. When a play has a run of 600 representations you go to one, perhaps, but not to the 600. It is only Homer or Shakespeare or Goethe you can read all the time.

Bad and germ-filled cow's milk is a danger to digestion, and is apt to disseminate infectious and contagious diseases. These dangers are avoided when cow's milk is pure. It is in the interest of those who are alive and anxious not to be killed, in the interest of the city and state, and of mankind, present and future, that milk *should* be clean and pure. When it has these properties it may be used for infant-feeding, but *not* in its pure, unmitigated, unmodified condition. It is true there are babies that no improper feeding, no indecent handling, no coarse or over-civilized maltreatment will destroy. These iron-clad young specimens of mankind are the excuses for the teaching—mainly in Paris, France, but also in its suburbs located in America—that pure cow's milk is the proper substitute for woman's milk. That is a mistake. Exceptional successes do not, as a silly proverb has it, prove the rule.

Cow's milk is no woman's milk, nor can any cow's milk ever so well modified or changed or adapted be equivalent to a healthy woman's good milk. The occasional possibility of obtaining good cow's milk, the theoretical teaching disseminated in good and bad books and pamphlets that chemical compositions suffice for the physiological demands of the young infant organism, and the imperturbable ubiquity of the proprietary-food vendor and advertiser have worked a great deal of harm in encouraging the reluctance of women to nurse their own babies. If the present and future babies are to live as hearty and competent citizens of this republic, no poverty, no cruel labor law, no accident, no luxuri-

[1] The complete text of this paper, from which the following pages are extracted for the lay reader, may be had in the *Maryland Medical Journal* for June and the *New York State Medical Journal* for July.

ous indolence must interfere with the nursing of infants. Not nursing one's own baby comes next to refusing to have any. Antiquity did not know of artificial infant-feeding. The first information we have of it dates at 1500. Turks, Arabs, Armenians, Kurds, the Circassians, and the Fellahs of Palestine have no artificial infant-feeding. Even wet-nursing was not indulged in in old Hellas, for Hippocrates does not even mention it. It is true wet nurses were permitted amongst the Persians and the ancient Indians, to whom Soranus gave careful instructions on the selection of a wet nurse. They were also employed by the rich Anglo-Saxons of the middle ages and amongst the ancient Romans. Even that, however, was complained of. Tacitus mourns that there were no longer any great men in Rome because they were nursed by slave wet nurses. The stout-hearted Roman, in the interest of his country, was not satisfied with having his Roman boy suckle a vigorous barbarian woman. It is we that expect the future citizens, statesmen, savants, and pioneers to thrive on proprietary foods and milk mixtures.

But there are women that have all the loving fondness and all the sense of a mother's responsibility, but no milk. Since the more appropriate ass's milk is not obtainable, theirs are the cases for pure cow's milk, as properly modified as its nature will permit.

Pure cow's milk—no matter whether raw or boiled—should not form the exclusive food of an infant. It gives rise to vomiting of hard curds and to constipation, with its results—indican and diacetic acid in the urine and secondary irritation or inflamation of the kidneys, also pyelitis. When practitioners will get into the habit of examining the easily-obtainable urines of little children, and consent to learn the fact that nephritis is a common disease in the smallest of babies—commoner, indeed, than even in the old and senile—they will appreciate the unfavorable influence in that direction of even the purest cow's milk which is fed unmixed. One of the frequent legitimate outcomes of constipation, when local irritation is the result of hard milk curds, is diarrhœa, which should not be considered as an innocent relief to the overcrowded gut, but will turn into the bad forms of microbic enteritis, the accurate knowledge of which we owe to Booker of Baltimore, Escherich of Gratz-Vienna, and Czerny of Breslau. Not a few cases of fatal atrophy owe their origin to the overfeeding with unmodified pure milk on account of the dyspepsia caused by it. Finally, though rickets is more readily produced in the infants closely confined in hot and airless rooms, mainly during the cold seasons, one of its causes is improper food materials, amongst which unchanged, undiluted milk takes a high rank.

All of this proves that pure milk should not be given as an exclusive food. I repeat that many a baby will live through such an exclusive feeding. But mere survival is not the only object of a child's bringing up; what you want is persistent good health and vitality and resisting power.

Variation in Human Milk.

What is cow's milk, and what is human milk which it is to replace? Are they always alike? By no means. It is not much easier to define the nature of a good cow's milk than that of a good human breast milk. We appreciate the clinical differences of the milks of different cows, or different herds, or races. All of them are good pure milk, however. But these differences are by no means equal to those met with among women. A baby may thrive on the milk of one woman, and not on that of another. That is why the substitution of a wet nurse for the mother is not infrequent. Even old Soranus speaks of exceptional cases of infants that thrive better at the breast of a nurse like a plant that requires an occasional transfer to a strange soil. According to Monti, the constituents of a woman's milk are only "more or less constant." That means inconstant. Johannessen and Wang (*Z. f. phys. Chemie,* XXIV) found in them the albumin to range from 0.9 to 1.3 per cent., the fat from

2.7 to 4.6 per cent., and the sugar from 5.9 to 7.55 per cent. Still, they were all good milks. They also found the amount of sugar to be less and that of fat and albumin larger toward the end of a single nursing, and the fat to reach its minimum in the course of the night. Biedert (than whom there is nobody more accurate and searching) found the nitrogen in woman's milk to vary from 0.129 to 0.192 per cent. and the fat from 1.67 to 3.35 per cent. at equal periods after birth. But these differences are not found in the same woman. Each has a fair stability in regard to nitrogen and fat, exactly like a cow. Therein lies one of the reasons why a fair amount of equality of results is obtained only when the milk of a herd is analyzed instead of that of a single cow. It might strike you, however, as quite natural that as a baby may thrive at the breast of a woman after nearly being destroyed by the milk of another healthy woman, the same thing may take place when you feed your baby on the milk of a single cow. He may not thrive on it, while the substitution of another cow, with a different milk, may be appropriate. And the great probability is that the average milk of a herd, the employment of which I advised forty years ago, will so dilute the improper qualities of the milk of a single cow by the mixture with that of fifty others as to render them uninjurious.

Of the thousands of recorded analyses of human milk and of cow's milk no two are identical. Besides, modifications of breast milk occur during nursing from minute to minute, from morning to night, on account of changes of food, state of health, during menstruation, periods of lactation, diseases, or emotions. *And they are all good breast milks and perfectly digested by the individual babies.* Even moderate changes in the health of the baby make few difficulties. The baby will adapt the quantity of the accustomed food to its pathological changes—gastritis, enteritis, or other feverish diseases—provided the proper amount of water is supplied to the baby while it is more thirsty than hungry. If exactly the same physical and chemical composition were required, the milk of our mothers would have killed every man and woman in this hall.

The Problem Physiological as Well as Chemical.

It has occurred to me, as it has to others, that if there were premeditation in this changeability of the milk of single women and of single cows it is surely successful. The changes in the relations of constituents mean all the proteids and carbohydrates, including sugar, and the salts. It is mostly the latter that cause the taste. In the milk of his own mother or his own cow, if, by a happy accident, the proper one has been selected, the baby has the correct composition and a proper *change.* If there were no such *changes,* he would lose his appetite and health. The uniformity of the food, though sufficiently nutritious, in prisons, boarding schools, boarding-houses and hotels, and its influence on appetite and taste and health, some of you may be acquainted with. I am. Your appetite gets lost, your digestion impaired, and your weight and health reduced; if not, perhaps, ill-nutrition shows itself in adiposity. And the baby? Between his natural meals there is a diversity in fat, albumin, and sugar and salts. Furthermore, he takes as little or as much as he pleases. When he is fed artificially, however, the poor thing gets six ounces or eight ounces under the doctor's or nurse's orders—willy-nilly—of the same, gradually more and more unpalatable, because undiversified, mixture or modification or Walker Gordonation. Statistics are a fine method of proving things when carried far enough and blended with intellect, which need not be the rule. For instance, an artificially-fed baby thrives wonderfully on a certain mixture for two or three months. Miraculous result! The same end is obtained in other cases and eulogized in a mercantile firm's circulars. They swear they never lie. Then follows dyspepsia, obesity or diarrhœa, finally, perhaps, scurvy. These are not chronicled by the tradesman, but perhaps by medical observers as the result of that very food. Correctly, it is true. Why? Is it that very food on which others have been doing well? No. The fault may lie in the tedious uniform-

ity of that very food. That is why you may see scurvy even when you feed sometimes a mother's doubtful milk, or more times cow's milk, pasteurized, boiled or sterilized, or proprietary foods, or what not. From your own experience you know all about what is considered correct feeding. Your milk is pure, is nearly germ-free; you know and insist upon a certain percentage of fat in it; it is pasteurized or sterilized just so many minutes; you are imbued with the gospel of top milk, boiled water, lime water, the bottle, the temperature, the number of ounces, week in, week out, month in, month out. Indeed, we allow ourselves to be controlled by mathematics and chemistry. If nature were as pedantic as we are, we should all be shaped over one last, in one crystalline form. There would be no harm could we men all look like Welch or Osler, but the world would be less interesting, after all. I say it is a good thing for a baby to be fed on his mother's milk. It will change at frequent intervals, though in physiological limits. Consequently the pedantic uniformity of laboratory feeding according to ironclad rules is not natural. The baby's digestive organs have to perform physiological functions, and are not governed by the chemistry of the test tube. Even L. Emmet Holt and William H. Park, the famous apostles of close-percentage modification of milk, say that "although desirable in difficult cases, it is not necessary in order to obtain excellent results in the great majority of infants, and a certain adjustment of a healthy infant to its food is usually soon secured." That is what I have been preaching these nearly 50 years. But, then, it did not look as scientific, chemical and ironclad!

Cow's Milk: Human Milk:

Cow's milk, when ready for consumption, is furnished to the baby in different ways. Some of these ways are tolerated by many, some by the vast majority, none in every case. Pure cow's milk is given unchanged and raw, or it is pasteurized or boiled or sterilized, or it is mixed in order to accomplish certain ends. As in most questions of hygiene and medicine, theory and practical experience must go hand in hand. In the feeding of infants nothing has been more detrimental than the repeated attempts at solving a physiological problem by the sole aid of chemistry.

There are other differences, both biological and chemical. Wassermann and Schütze (*Ges. f. innere Med.*, 1900) injected 10 c. cm. of sterilized cow's milk under the skin of rabbits daily, a fortnight in succession. After that time their blood serum acquired the property of coagulating cow's milk—that is, its proteid—but not that of any other animal. Other animals were treated similarly with goat's milk, with the result that their blood sera would coagulate the albuminate either of goat's milk or of human milk, respectively. In every case the specific coagulating effect was observed in that kind of milk only with which the animal was previously treated.

There are also important chemical differences between the casein of cow's milk and woman's milk. . . . . After all, between the 3½ per cent. of casein contained in cow's milk and the one or two per cent. of casein contained in human milk there are essential biological, physical, chemical, and clinical differences.

Similar facts may be stated in regard to the fat of the two milks.

Fat, that is, cream, is added to cow's milk for two alleged reasons—first, to increase the nutritiousness of the food, and second, to enhance the digestibility of the casein. Now and then, however, you meet with an author—Monti, for instance; Jacobi another, for instance—who considers a high percentage of fat injurious. On the other hand, Schlossmann, quite a rising authority, declares the belief in the injuriousness of fat "antiquated." In our country the several modifications—those of Rotch or of Holt—are very positive, or have been so, in the demands of a high percentage of fat.

I prefer a low percentage of cream in infant-feeding for the following reasons: First, the normal stools of the infant contain unabsorbed fat, no matter whether fed on mother's or on cow's milk. . . . . Second, woman's

milk and cow's milk have nearly the same percentage of fat, and the undiluted cow's milk should never have cream added to it. Bunge has 3.8 per cent. for woman's milk, 3.7 for that of the cow. . . . . *Experience teaches that the babies thrive best on less fat.* Formula No. 2 of the Nathan Strauss Laboratory, which has been furnished to tens of thousands of babies, reads as follows: Water, 90.11; solids, 9.89. The solids not fat are 7.70; there are 2.19 fat, 5.56 cane-sugar, 0.39 ash, and 1.75 proteids. This is meant for babies from four to eight months old. On that they thrive. And a similar composition I have used these fifty years of private and institutional practice. The first of four formulae supplied in Chicago to very young infants contains fat 1.5, milk sugar, 5, and proteids 0.5. Third, there is a chemical and a physical difference between the fat of the two milks. Woman's milk has more oleic acid than cow's milk. Woman's milk contains its fat in a finer emulsion, and holds from two to four times as many fat globules as are contained in equally fat cow's milk (Schlossmann). This condition makes it more digestible. It is assumed, and reasonably so, that the fine fat globules are absorbed directly through the epithelia of the intestinal villi. Moreover, cow's-milk fat before it is used undergoes changes. When taken after slow rising it is apt to be acidulated; when sterilized and centrifuged it is changed chemically and physically; when frozen it separates from the milk and does not mix again.

The modern experience in infant-feeding with buttermilk seems to upset all the fine-spun theories of the laboratories. It appears to be proven by the results of Dutch peasants and many first-class European clinics that buttermilk—which, indeed, cannot be claimed to be like woman's milk, either physically or chemically—is an excellent nutriment in acute and chronic gastroenteritis of the young, in grave dyspepsias, in the chronic dyspepsias (for instance, of syphilis), and also in their healthy condition. Its percentage of sugar is only 2.82 to 3.5, of albumin 2.5 to 2.7, of fat only 0.5 to 1. Still, *the infants thrive.* The literature of the last few years, which has become quite extensive, and the names, many quite illustrious, of the sponsors of the buttermilk feeding prove it. They merely confirm the old experience of the Dutch peasant population. . . . . .

Further Comparison.

The cow's milk mixture which is to be administered to infants requires sugar, which makes it more palatable and less constipating, and restores, to a certain limited extent, the approximate composition of woman's milk. The latter contains 6 or 7 per cent. of sugar, cow's milk only 3 or 4 per cent. Imagine your cow's mixture or dilution contains 50 per cent of milk; so there is only 1½ per cent of sugar in it. This sugar is milk sugar. Now, should milk sugar or cane sugar be added?

Breast milk plunges into the infant stomach directly unchanged and sterile; in the cities, cow's milk has to wait from one to twenty-four hours before it reaches the consumer. Its milk sugar begins to be changed into lactic acid immediately after milking. This lactic acid, together with the rennet of the stomach and the acids formed out of the fat of the milk, are the final causes of curdling. If you meet with a milk that is no longer alkaline—indeed, some milks are acidulated in the udder, and many more are amphoteric, that is, neutral—the decomposition of the milk is very rapid. It is true not all the sugar contained in cow's milk sent into the stomach is changed into lactic acid. Usually this change stops when one-sixth or one-quarter of the milk sugar has been so changed. Only when an alkali is present in the stomach and neutralizes the lactic acid more of the latter is formed. Thus, indeed, the amount of lactic acid which is produced depends on the accident of an alkali being present or absent. That is why the routine use of sodic carbonate or bicarbonate may become a dangerous procedure. This fact appears to prove that a small amount of lactic acid suffices for the demands of normal digestion. That becomes still more apparent when we learn that some of the milk sugar passes through the in-

testinal tract undigested. Blauberg (*Studien über Säuglingsfäces,* p. 55) found the dried feces of the nursling to contain from 0.22 to 0.59 per cent of milk sugar. This happens even to woman's milk sugar. And Escherich found that peptones which form in milk while in the intestines previous to normal absorption are destroyed by acid fermentation, and concludes that for that reason alone another carbohydrate (*i. e.,* starchy food or cane sugar) should take the place of milk sugar in order to avoid an excess of lactic acid. Moreover, Dr. Helen Baldwin has published (*Journal of Experimental Medicine,* Vol. V) investigations which prove the formation of oxalic acid as the result of intestinal fermentation. Thus, surely, it seems to be easier to give too much milk sugar than too little, and it appears that the careful measuring and weighing of milk sugar are of doubtful value, even though you know, or believe you know, that the milk sugar of the market and the milk sugar of woman's milk are identical, which they are not. All this refers to cow's milk that is obtained and utilized when still fresh. When it reaches the baby's stomach ten or twenty-four hours' old, with quantities of lactic acid formed, Escherich's warning is still more urgent. . . . . .

What I conclude from all this is that every cow's milk mixture contains a sufficient amount of milk sugar for the needs of digestion, and that no milk sugar, but some other sugar should be added, viz., cane sugar, which, in its chemical atoms, is identical with milk sugar, but is not changed into lactic acid. Indeed, it counteracts the rapid conversion of milk sugar into lactic acid—is rather a preserver of milk in its purity. You know that cane sugar is employed by the trades for the purpose of preserving foods. Amongst them is condensed milk, which, though reprehensible as a food when pure cow's milk can be obtained, is an indispensable makeshift in the service of the hundreds of thousands of our large cities to whom pure milk is a *terra incognita.* . . . . .

Cane sugar is not changed to an acid in the intestinal canal. It is easily absorbed, and is not detrimental. It is, according to Pavy, partly inverted into grape sugar and partly absorbed directly. Grape sugar and dextrine are absorbed equally. Only in the sick the absorption of sugar is slow. Particularly in the diseases of the alimentary canal, in which there is increased fermentation in the mouth, stomach, and intestines, the ingested quantity of sugar should be diminished and diluted. . . . . .

The large per cent of casein in cow's milk compared with that contained in human milk—without regard to their physical, chemical, and physiological differences—necessitated the dilution of cow's milk when required for infant-feeding. The material for dilution was water, the principal constituent of everything organic. Its *rôle* in the anatomy of the human body has been the subject of a thousand researches.

Fehling, Camerer, and Söldner have studied the percentage of water in the composition of the fetal and infant tissues. It is ninety-four in the fetus of three months; after the sixth fetal month and at birth it is sixty-nine to sixty-six, and in the adult only fifty-eight. More than one-half of this belongs to the muscles, 27 per cent. to the bones, and only 10 per cent. to the fat of the body. So the tissues of the newly born contain 10 per cent. more water than those of advanced years. Immediately after birth the excreting functions of the lungs, skin, and kidney, also the intestines, display a new activity. Unless a sufficient amount of water is furnished to the newly born the tissues lose their physiological equilibrium and their functions are impaired. That a baby had no new supply of water the first day or days of its life was the rule until its rights and necessities were recognized in our more thoughtful modern era. The time when the loss of 10 or 20 per cent. of the weight of a newly-born infant was considered normal is well remembered even by those of you who are quite young. Now if there be no milk, water is the least you can give. But even if the young mother *has* milk, that milk is colostrum, which contains from 3 to 5 per cent. of nitrogenous

substance — more than four times the percentage contained in the milk of the second week and ever afterwards. That is why natural baby food is better digested with than without additional water. The danger is particularly great in the milks of mothers that have been prematurely confined, for in their milk the percentage of proteids is disproportionately still higher. First, kind nature expels them before they are matured; then she supplies them providentially with indigestible food, which should be corrected by ample dilution.

The dilution of cow's milk for the newly born should be from four or six to one, and for a baby of six months one to one. That is required to make milk digestible. There are more reasons, however, for a high degree of dilution. Our babies are not given enough water. Breast and the bottle, as mostly prepared, contain food, not water. When babies are hungry they cry; when they are thirsty they speak the same language. In either case they are given food, not drink. That is why babies should frequently be offered pure spring or boiled water in some shape or other, and it is easiest to add it to their food. The objection made to this plan is that it is said to lead to dilatation of the stomach. That objection has been constructed at the writing desk. . . .

Diluents in Artificial Feeding.

What I have said of the coagulability of cow's casein and its general difference from the casein of human milk, of the dissimilar character of the fat contained in the two milks, of the dangers to digestion resulting from the excess of lactic acid in the intestine, and from the advice given by Escherich and others to replace milk sugar by some other carbohydrate, makes the substitution of a diluent more efficient than mere water advisable. That diluent should render an additional service, that is, it should be of such a nature as to prevent the coagulation in hard lumps of the casein of the cow's milk when introduced into the baby's stomach. Normally, the coagulum of mother's milk is soft and flaky; that of cow's milk hard and firm. Means should be found to avoid the latter occurrence, but such means as will be agreeable to every infant stomach. . . .

My experience taught me the digestibility of small quantities of cereals. I was pushed aside until thirty-five years ago Schiffer, Korowin, and Zweifel established beyond doubt, with the aid of simple experimentation, the diastatic function of the salivary glands even in the newly born. Was this teaching accepted and utilized in the practice of medicine? Oh, no! It was much simpler to take no notice of it. Then, some twenty-five years later, a great pediatrist, Heubner, came to the conclusion that the gut of the baby when diseased did better with flour than without it. Flour of rice and of oats was extolled for curative purposes, but not yet for nutrition. Only gradually cereal decoctions were added to cow's milk in place of water, and lo and behold, we are at present in a new epoch of teaching where every tyro in pediatry discovers all by and through and for himself the new gospel of the cereals! . . . .

Old men in the profession—if there be any old men in the profession, which I sometimes deny—may remember that I always recommended cereals, mainly oatmeal or barley, the raw, and not the dextrinized material, in such a proportion that about a tablespoonful of the powder was boiled with a little table salt in a quart of water one-half hour, more or less, down to a pint, this decoction to be used in certain proportions with the sugared and salted cow's milk, the whole to be boiled or sterilized before using. I selected these particular cereals for the reason that they included enough iron and other salts, and vegetable albumin, and as *little* starch as any cereals or farinacea are known to contain. . . . .

The digestibility of cereals by the infant, though the pancreas may not have obtained its complete function, is enhanced by a peculiar condition of the gut of the baby. It is relatively longer and has more absorbent villi of the mucous membrane. Indeed, the lymph vessels all over the infant system are more numerous and are larger.

Barley and oatmeal have an almost equal chemical composition; the latter has a greater tendency to loosen the bowels. That is why, when there is a tendency to diarrhea, the barley is preferable; when constipation, oatmeal. The whole barleycorn, ground for the purpose, should be used for small children, because the proteid is contained near the husk, moreover on account of its percentage of iron.

Artificial feeding requires the addition of table salt (sodium chloride). According to Voit's old teaching, it improves metabolism by increasing the secretion of the kidneys. Of greater importance, however, is the fact that the chloride of sodium of the food is the source of the formation of hydrochloric acid of the gastric juice. . . . .

In vegetables, cereals included, potassium predominates. Potassium is found in the blood as a phosphate, sodium as a chloride. They interchange so as to form sodium phosphate and potassium chloride. Both are quietly eliminated through the kidneys. The potassium being present in overwhelming quantities, too much sodium chloride is eliminated, and it must be replaced by feeding.

In regard to the quantity of food, we begin to appreciate the fact that our babies, like ourselves, eat too much. We need not go the whole length of Chittenden's practice, but still be impressed with the truth of his teaching—that the minimum demand of food should be ascertained, particularly for those babies who are limited to the less digestible cow's casein. Besides, the intervals between the meals should not be too short. That of two hours is too short for even the smallest baby. Twenty-five years ago I emptied a great many infant stomachs, and never found one quite empty two hours after a meal even when it consisted of mother's milk. Cow's milk should have at least half an hour more even in the first two months.

Another question is raised in regard to the strength—the gradual increase of solids in an infant food. . . . .

My custom has been to gradually increase the strength of the milk mixture employed in infant-feeding. The newly born is given 20 or 25 per cent. of milk in a thin barley or oatmeal water; the infant of six months equal parts. In the interval a gradual increase of milk takes place. Whenever there is an intestinal disorder—vomiting or passing of curd—the milk is temporarily diminished. Observation and common sense are both more instructive and beneficial than mathematical rules. The baby is no crystal, but an organism.

If raw milk could always be had unadulterated, fresh, and untainted, and as often as it was wanted, it would require no boiling. Heating might even be contraindicated unless great care be taken, for high temperatures, beyond destroying dangerous microbes, may injure those required for normal digestion.

But moderate boiling or sterilization is by no means always a positive protection. Aerobic bacteria, the hay or potato bacilli, with their resistant spores, require sterilizaton of many hours before they are destroyed. . . . .

But, sterilization prolonged until it kills streptococci and bacilli first kills the milk as a nutrient. There is no more frequent cause of infantile scurvy than this prolonged sterilization, of which mothers and nurses are so proud. . . .

But, after all, what you have been advised in former lectures remains true in the large majority of cases. Pasteurization at 150° F., short boiling, or short sterilization will mostly protect against the microbes of tuberculosis, diphtheria, cholera, and typhoid fever. . . .

The other thing to be remembered is what you have been taught this winter and what you have promoted in your efforts to obtain pure milk. You know it all. Proper feeding and stabling, and clean skins of cows and men, clean pails and bottles and nipples — there is the main part of the salvation of the bottle-fed baby. *"Ceterum censeo,"* in the words of old Cato. *The own mother belongs to the baby and the baby to the own mother.*

"The Industrial Viewpoint," conducted by Professor Graham Taylor, will be resumed in the September magazine number.